US007151886B2

(12) **United States Patent**
Young et al.

(10) **Patent No.: US 7,151,886 B2**
(45) **Date of Patent: Dec. 19, 2006**

(54) **USER INTERFACE FOR TELEVISION SCHEDULE SYSTEM**

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(73) Assignee: **StarSight Telecast Inc.**, Los Angeles, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 37 days.

(21) Appl. No.: **11/181,188**

(22) Filed: **Jul. 13, 2005**

(65) **Prior Publication Data**

US 2005/0251836 A1 Nov. 10, 2005

Related U.S. Application Data

(60) Continuation of application No. 10/943,288, filed on Sep. 17, 2004, which is a continuation of application No. 10/616,137, filed on Jul. 9, 2003, which is a continuation of application No. 10/393,489, filed on Mar. 19, 2003, now Pat. No. 6,850,693, which is a continuation of application No. 10/081,141, filed on Feb. 22, 2002, now abandoned, which is a continuation of application No. 09/277,703, filed on Mar. 26, 1999, now Pat. No. 6,498,895, which is a continuation of application No. 08/480,205, filed on Jun. 7, 1995, now Pat. No. 5,949,954, which is a division of application No. 08/198,538, filed on Feb. 18, 1994, now Pat. No. 5,479,268, which is a continuation of application No. 07/579,555, filed on Sep. 10, 1990, now abandoned.

(51) **Int. Cl.**
H04N 5/91 (2006.01)
H04N 7/00 (2006.01)

(52) **U.S. Cl.** **386/83**; 386/46

(58) **Field of Classification Search** 386/83, 386/46, 125, 126, 1; 725/39, 80, 180
See application file for complete search history.

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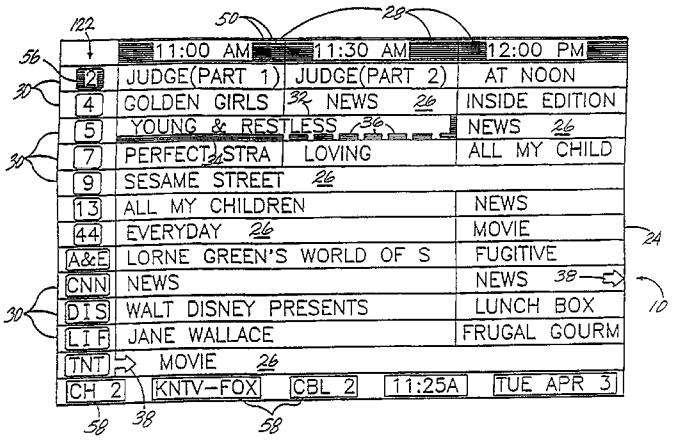

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JP	63-247812	10/1988
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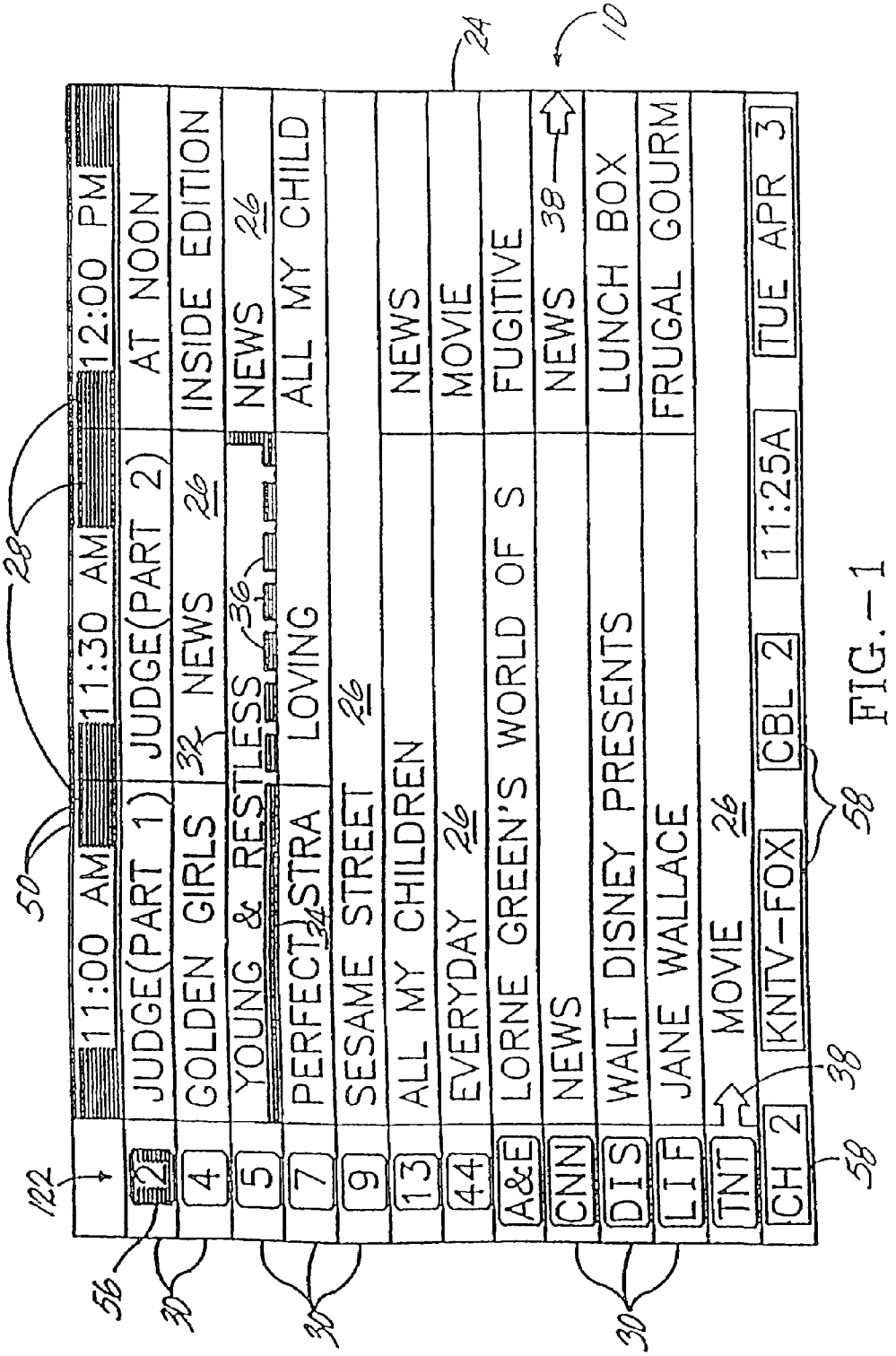
Primary Examiner—Robert Chevalier
(74) *Attorney, Agent, or Firm*—Fish & Neave IP Group Ropes & Gray LLP; Gall C. Gotfried

(57) **ABSTRACT**

Screen (**10**) for a user interface of a television schedule system and process consists of an array (**24**) of irregular cells (**26**), which vary in length, corresponding to different television program lengths of one half hour to one-and-one half hours or more. The array is arranged as three columns (**28**) of one-half hour in duration, and twelve rows (**30**) of program listings. Some of the program listings overlap two or more of the columns (**28**) because of their length. Because of the widely varying length of the cells (**26**), if a conventional cursor used to select a cell location were to simply step from one cell to another, the result would be abrupt changes in the screen (**10**) as the cursor moved from a cell (**26**) of several hours length to an adjacent cell in the same row. An effective way of taming the motion is to assume that behind every array (**24**) is an underlying array of regular cells. By restricting cursor movements to the regular cells, abrupt screen changes will be avoided. With the cursor (**32**), the entire cell (**26**) is 3-D highlighted, using a conventional offset shadow (**34**). The offset shadow (**34**) is a black bar that underlines the entire cell and wraps around the right edge of the cell. To tag the underlying position—which defines where the cursor (**32**) is and thus, where it will move next—portions (**36**) of the black bar outside the current underlying position are segmented, while the current position is painted solid.

26 Claims, 24 Drawing Sheets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11:30 AM
12:00 PM
JUDGE(PART 1)
JUDGE(PART 2)
AT NOON
GOLDEN GIRLS
NEWS
INSIDE EDITION
YOUNG & RESTLESS
NEWS
PERFECT STRA
LOVING
ALL MY CHILD
SESAME STREET
NEWS
ALL MY CHILDREN
EVERYDAY
MOVIE
LORNE GREEN'S WORLD OF S
FUGITIVE
NEWS
NEWS
WALT DISNEY PRESENTS
LUNCH BOX
JANE WALLACE
FRUGAL GOURM
MOVIE
KNTV-FOX
CBL 2
11:25A
TUE APR 3
2
4
5
7
9
13
44
A&E
CNN
DIS
LIF
TNT
CH 2
10
24
26
28
30
32
34
36
38
50
56
58
122

FIG. – 1

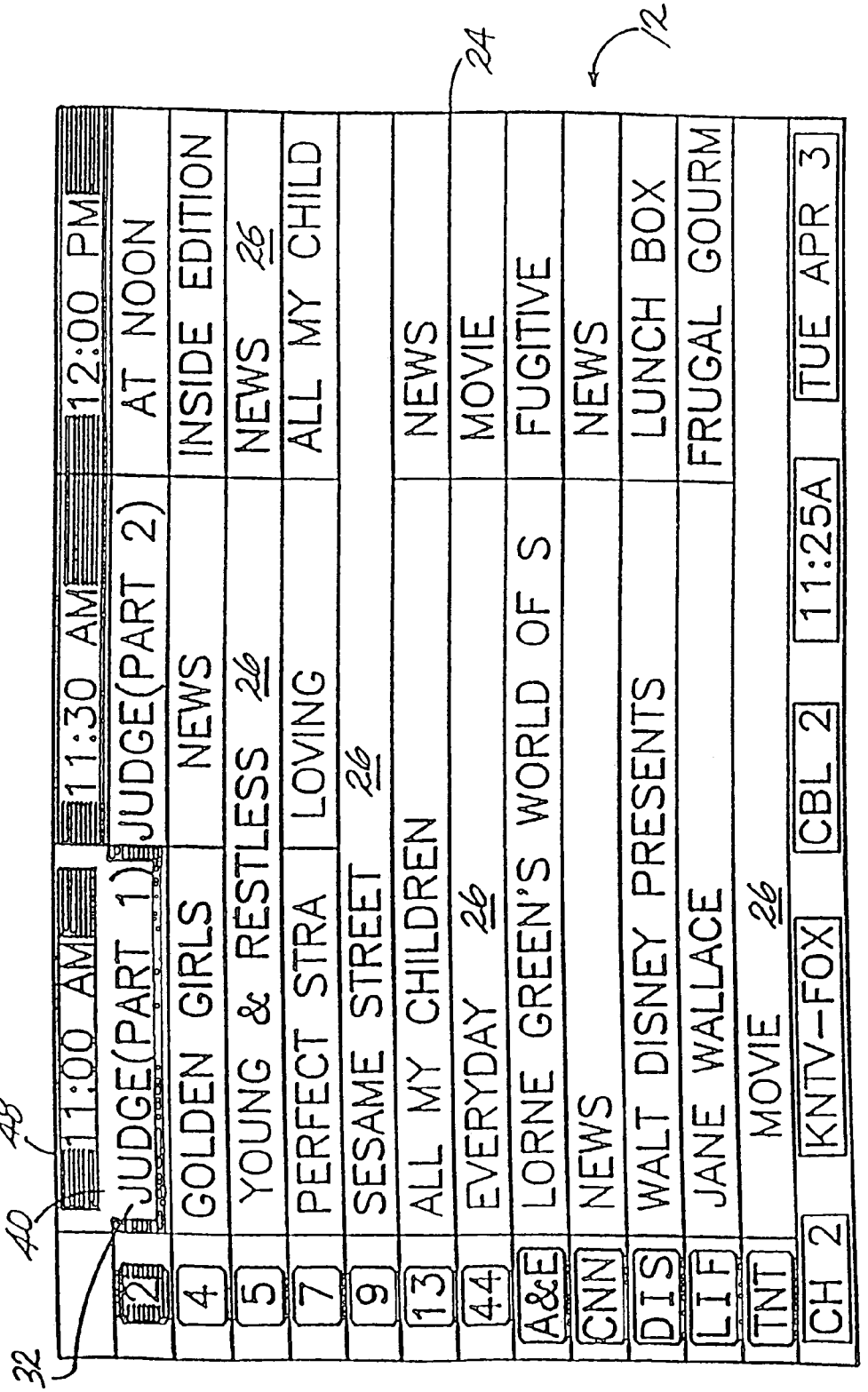
11:00 AM
11:30 AM
12:00 PM
JUDGE(PART 1)
JUDGE(PART 2)
AT NOON
E2
GOLDEN GIRLS
NEWS
INSIDE EDITION
4
YOUNG & RESTLESS 26
NEWS 26
5
PERFECT STRA
LOVING
ALL MY CHILD
7
SESAME STREET 26
9
ALL MY CHILDREN
NEWS
13
EVERYDAY 26
MOVIE
44
LORNE GREEN'S WORLD OF S
FUGITIVE
A&E
NEWS
CNN
WALT DISNEY PRESENTS
LUNCH BOX
DIS
JANE WALLACE
FRUGAL GOURM
LIF
MOVIE 26
TNT
CH 2
KNTV-FOX
CBL 2
11:25A
TUE APR 3
32
40
48
24
12

FIG.-2

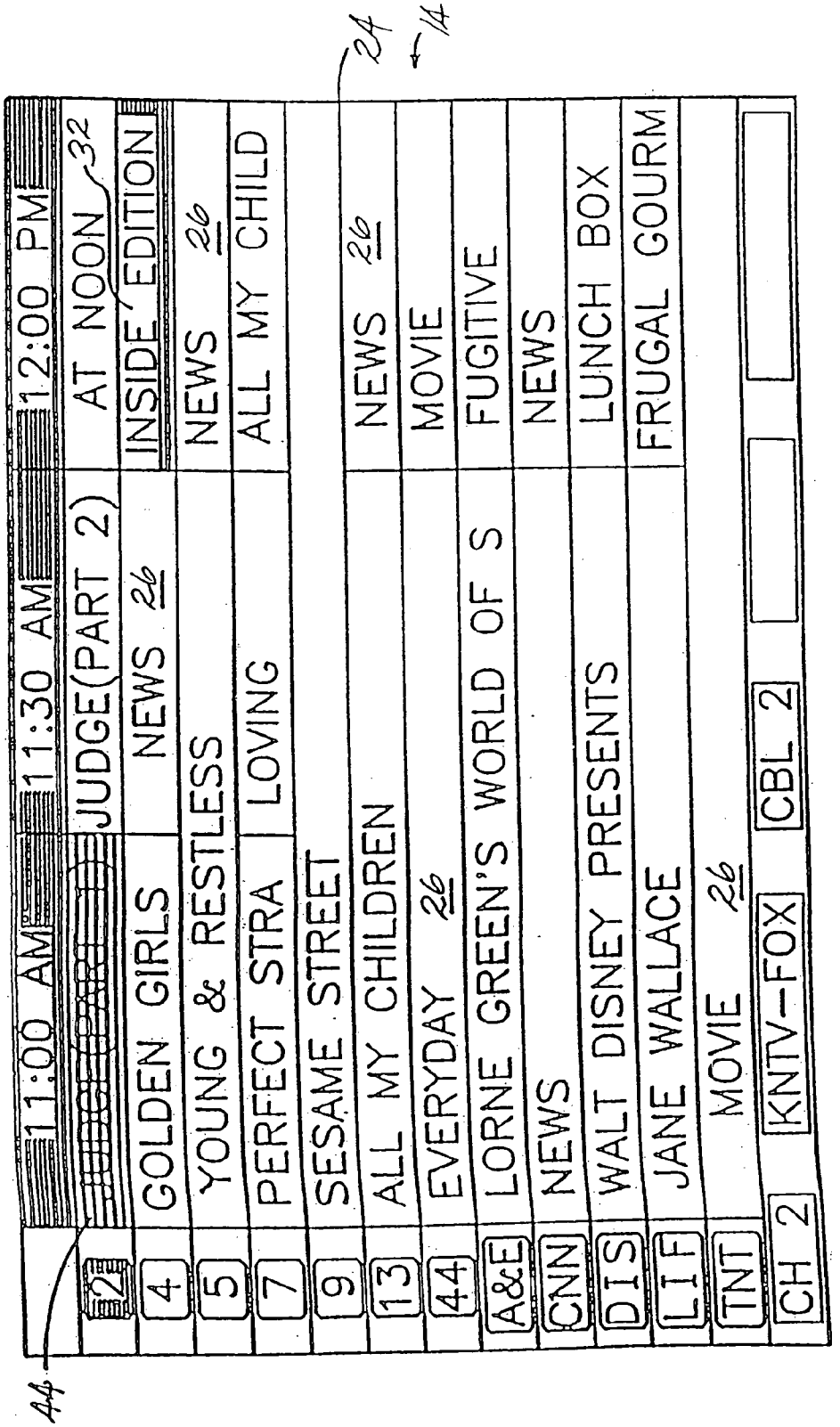
11:00 AM
11:30 AM
12:00 PM
JUDGE(PART 2)
AT NOON
32
INSIDE EDITION
2
4
GOLDEN GIRLS
NEWS
26
5
YOUNG & RESTLESS
NEWS
26
7
PERFECT STRA
LOVING
ALL MY CHILD
9
SESAME STREET
NEWS
26
13
ALL MY CHILDREN
MOVIE
44
EVERYDAY
26
FUGITIVE
A&E
LORNE GREEN'S WORLD OF S
NEWS
CNN
NEWS
LUNCH BOX
DIS
WALT DISNEY PRESENTS
FRUGAL GOURM
LIF
JANE WALLACE
TNT
MOVIE
26
CH 2
KNTV-FOX
CBL 2
24
14
44

FIG.—3

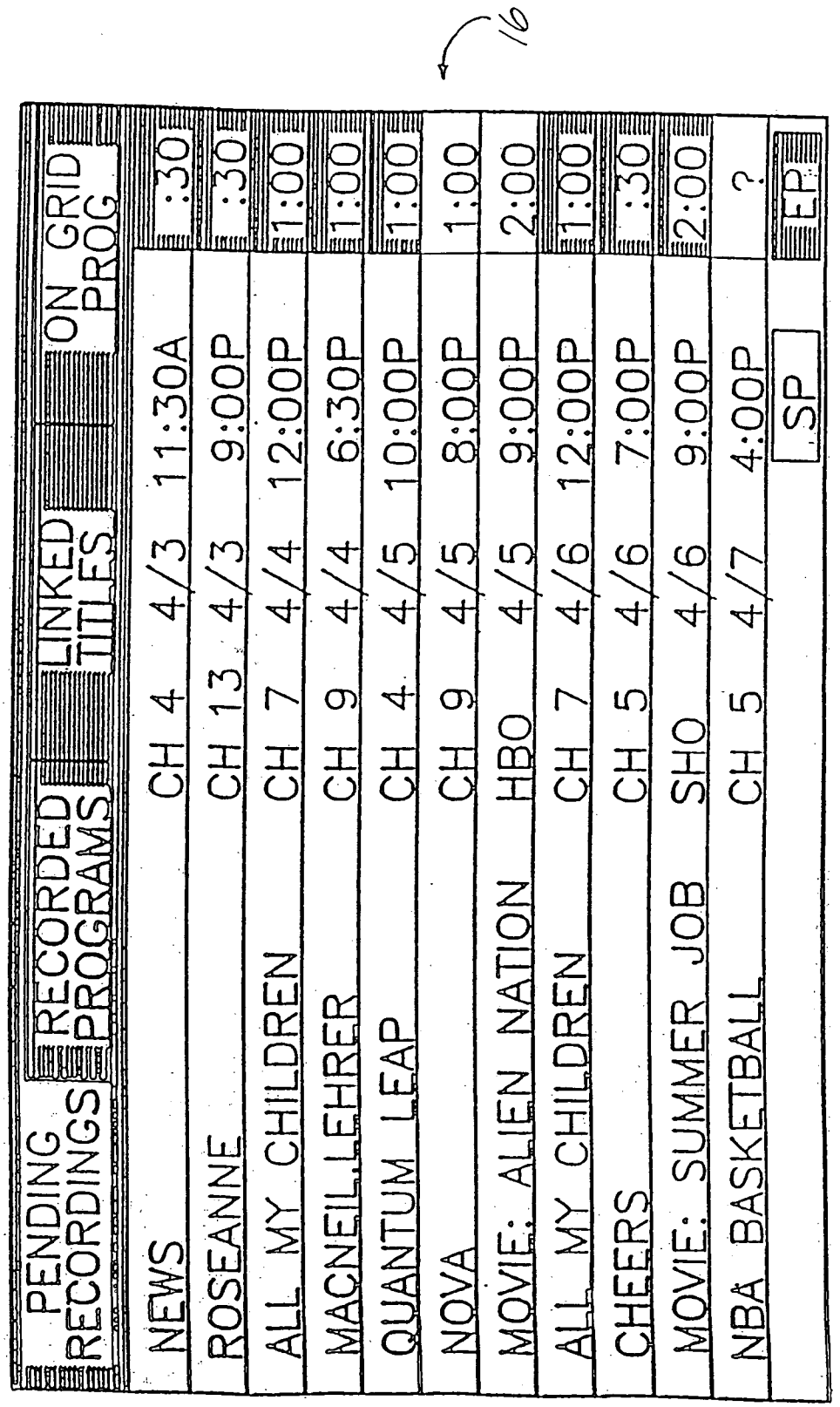
16
PENDING RECORDINGS
RECORDED PROGRAMS
LINKED TITLES
ON GRID PROG
NEWS CH 4 4/3 11:30A :30
ROSEANNE CH 13 4/3 9:00P :30
ALL MY CHILDREN CH 7 4/4 12:00P 1:00
MACNEIL/LEHRER CH 9 4/4 6:30P 1:00
QUANTUM LEAP CH 4 4/5 10:00P 1:00
NOVA CH 9 4/5 8:00P 1:00
MOVIE: ALIEN NATION HBO 4/5 9:00P 2:00
ALL MY CHILDREN CH 7 4/6 12:00P 1:00
CHEERS CH 5 4/6 7:00P :30
MOVIE: SUMMER JOB SHO 4/6 9:00P 2:00
NBA BASKETBALL CH 5 4/7 4:00P ?
SP
EP

FIG.—4

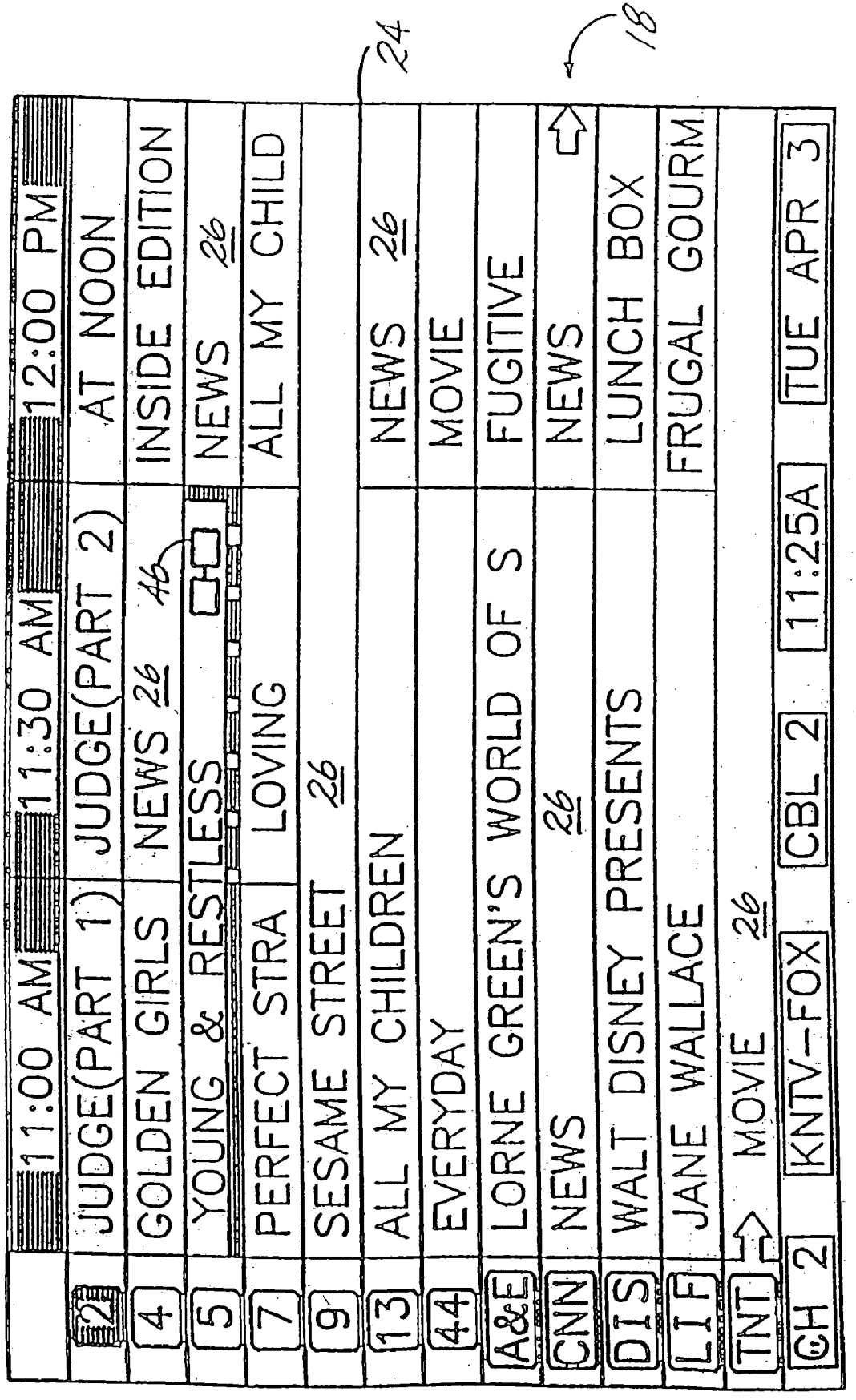
11:00 AM
11:30 AM
12:00 PM
2
JUDGE(PART 1)
JUDGE(PART 2)
AT NOON
4
GOLDEN GIRLS
NEWS 26
INSIDE EDITION
5
YOUNG & RESTLESS
NEWS 26
7
PERFECT STRA
LOVING
ALL MY CHILD
9
SESAME STREET 26
13
ALL MY CHILDREN
NEWS 26
44
EVERYDAY
MOVIE
A&E
LORNE GREEN'S WORLD OF S
FUGITIVE
CNN
NEWS 26
NEWS
DIS
WALT DISNEY PRESENTS
LUNCH BOX
LIFE
JANE WALLACE
FRUGAL GOURM
TNT
MOVIE 26
CH 2
KNTV-FOX
CBL 2
11:25A
TUE APR 3
24
18

FIG.—5

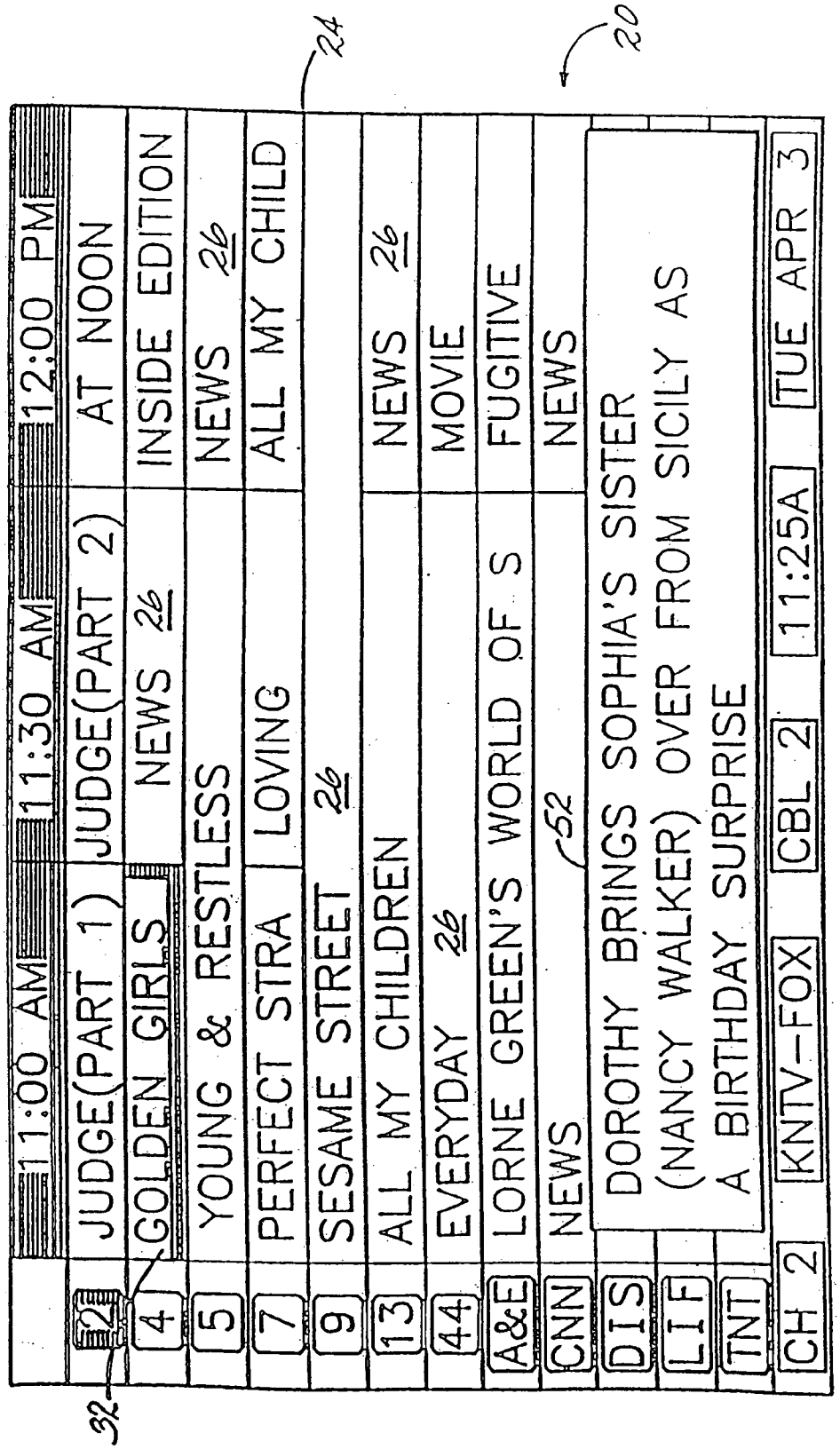
11:00 AM
11:30 AM
12:00 PM
2
JUDGE(PART 1)
JUDGE(PART 2)
AT NOON
4
GOLDEN GIRLS
NEWS 26
INSIDE EDITION
5
YOUNG & RESTLESS
NEWS 26
7
PERFECT STRA
LOVING
ALL MY CHILD
9
SESAME STREET 26
13
ALL MY CHILDREN
NEWS 26
44
EVERYDAY 26
MOVIE
A&E
LORNE GREEN'S WORLD OF S
FUGITIVE
CNN
NEWS 52
NEWS
DIS
DOROTHY BRINGS SOPHIA'S SISTER
LIF
(NANCY WALKER) OVER FROM SICILY AS
TNT
A BIRTHDAY SURPRISE
CH 2
KNTV-FOX
CBL 2
11:25A
TUE APR 3
24
20
32

FIG.—6

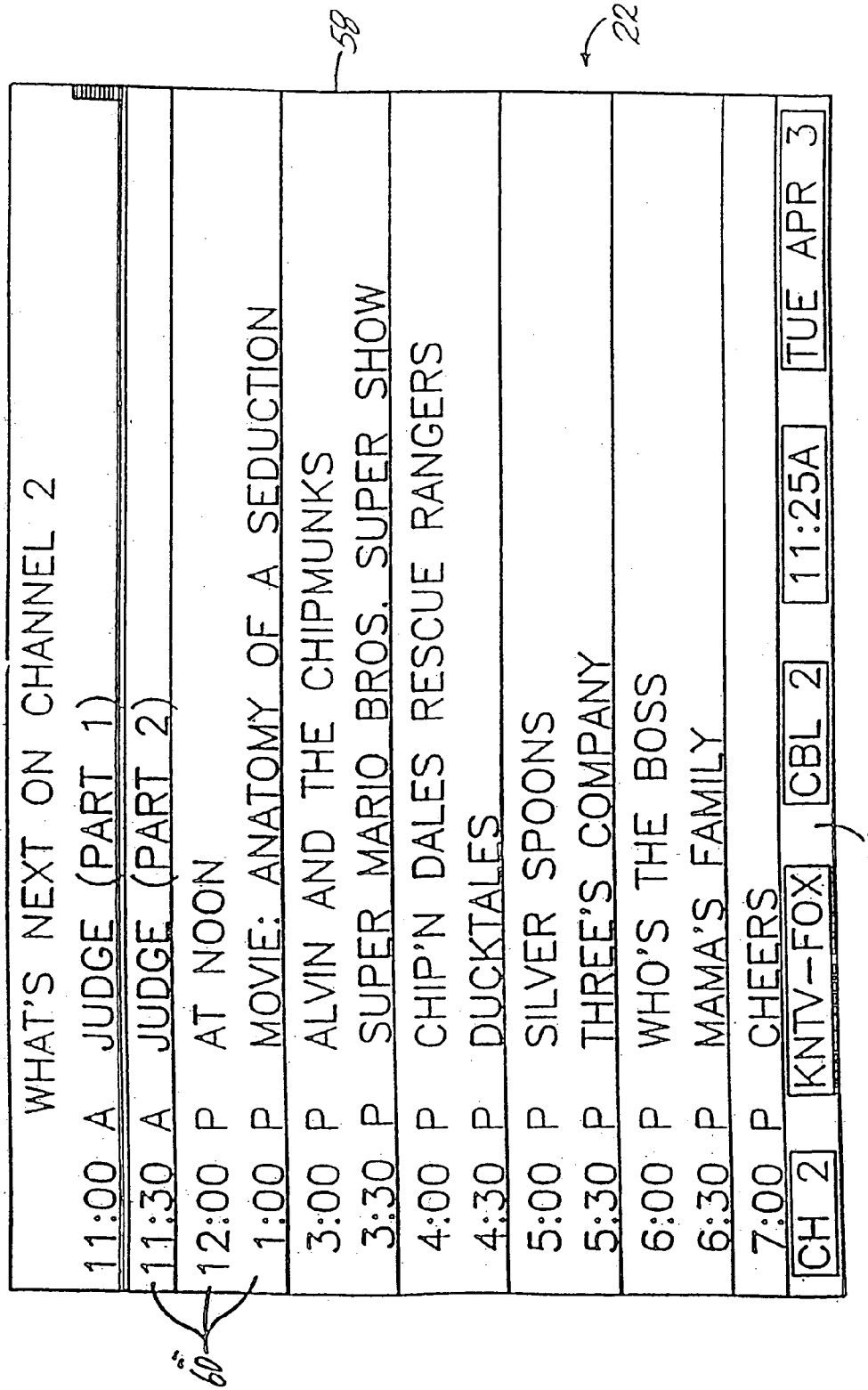
WHAT'S NEXT ON CHANNEL 2
11:00 A JUDGE (PART 1)
11:30 A JUDGE (PART 2)
12:00 P AT NOON
1:00 P MOVIE: ANATOMY OF A SEDUCTION
3:00 P ALVIN AND THE CHIPMUNKS
3:30 P SUPER MARIO BROS. SUPER SHOW
4:00 P CHIP'N DALES RESCUE RANGERS
4:30 P DUCKTALES
5:00 P SILVER SPOONS
5:30 P THREE'S COMPANY
6:00 P WHO'S THE BOSS
6:30 P MAMA'S FAMILY
7:00 P CHEERS
CH 2
KNTV-FOX
CBL 2
11:25A
TUE APR 3
58
22
60
62

FIG.—7

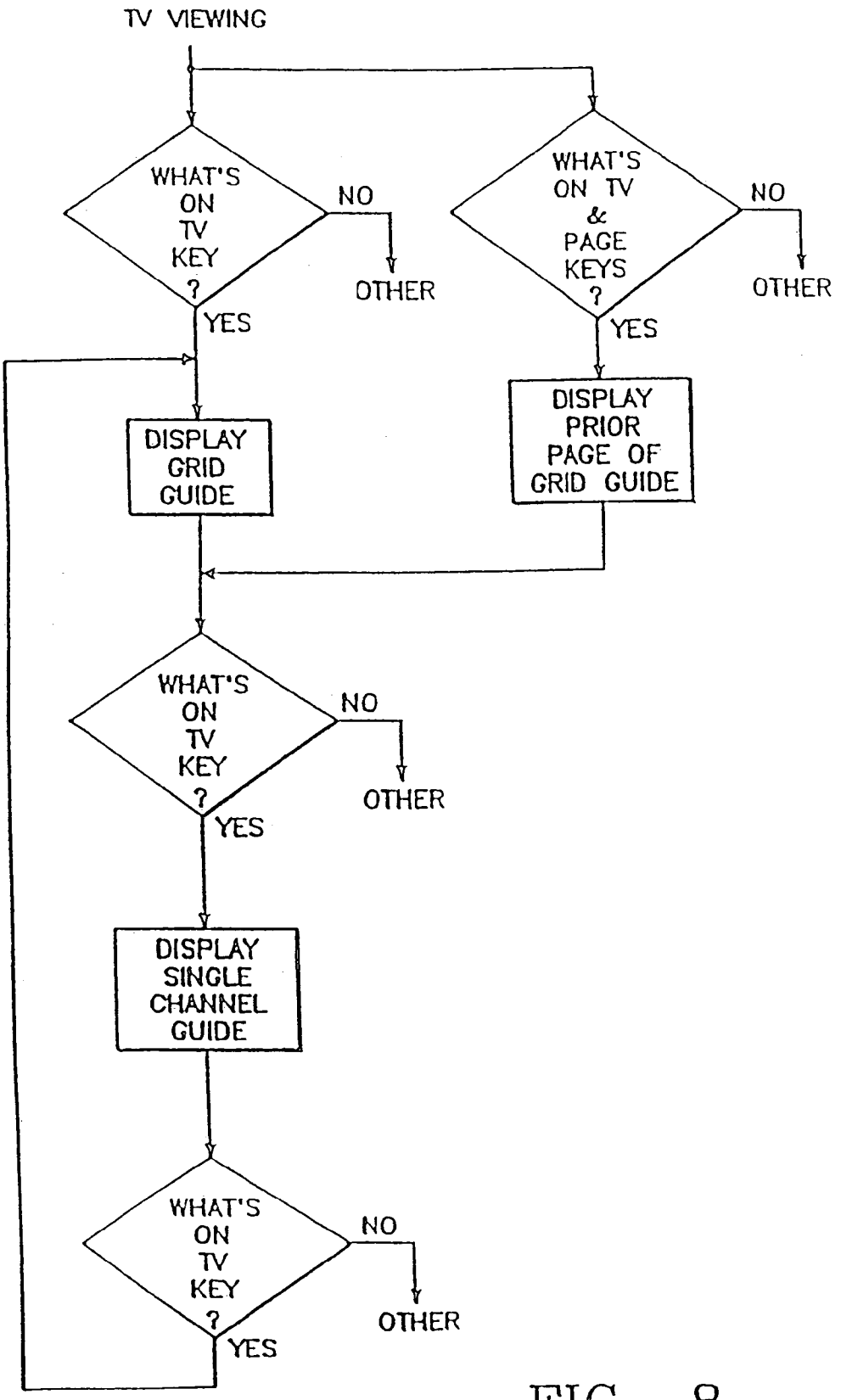
TV VIEWING
WHAT'S ON TV KEY ?
NO
OTHER
YES
WHAT'S ON TV & PAGE KEYS ?
NO
OTHER
YES
DISPLAY GRID GUIDE
DISPLAY PRIOR PAGE OF GRID GUIDE
WHAT'S ON TV KEY ?
NO
OTHER
YES
DISPLAY SINGLE CHANNEL GUIDE
WHAT'S ON TV KEY ?
NO
OTHER
YES

FIG.—8

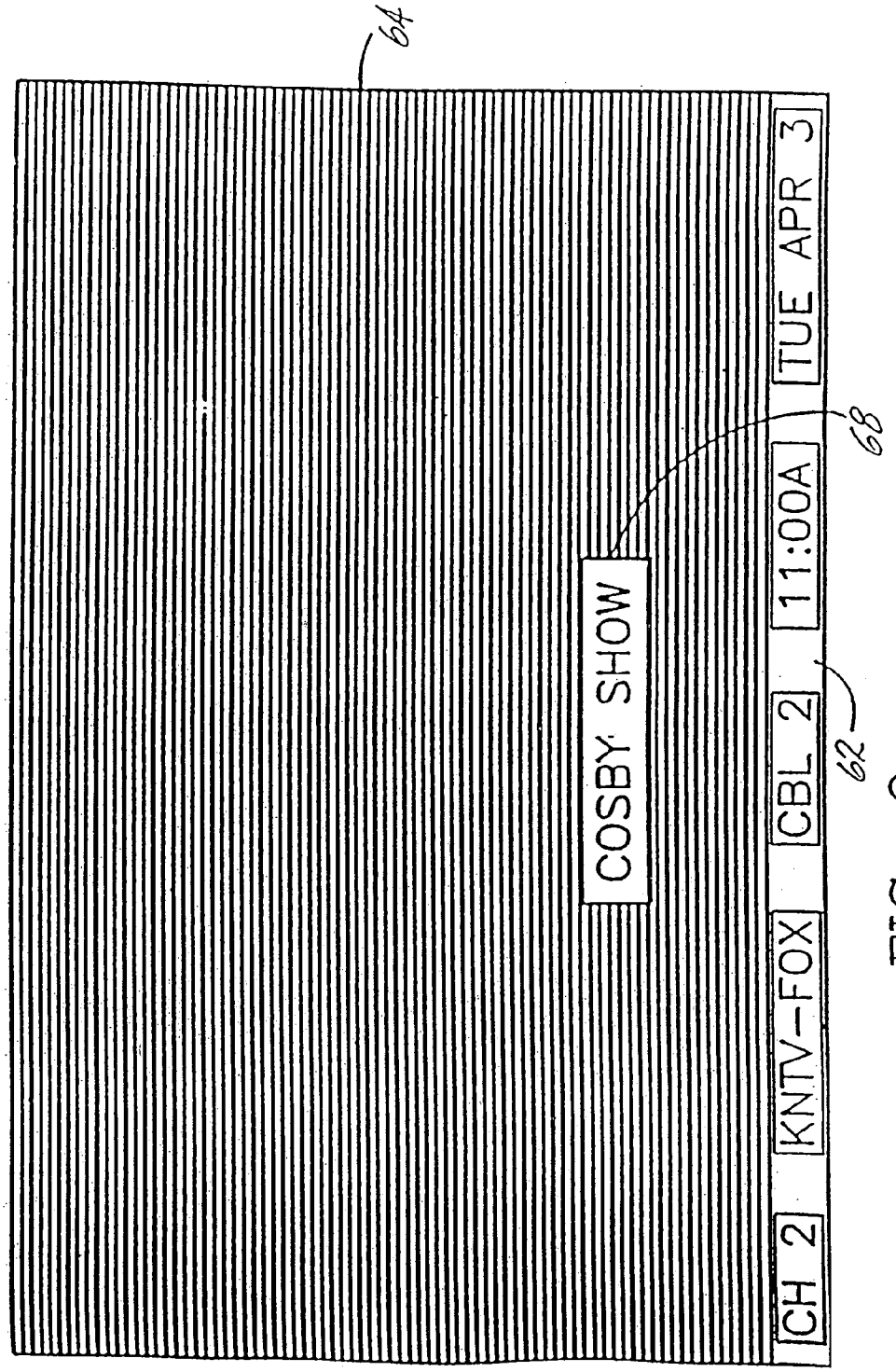

FIG.-9

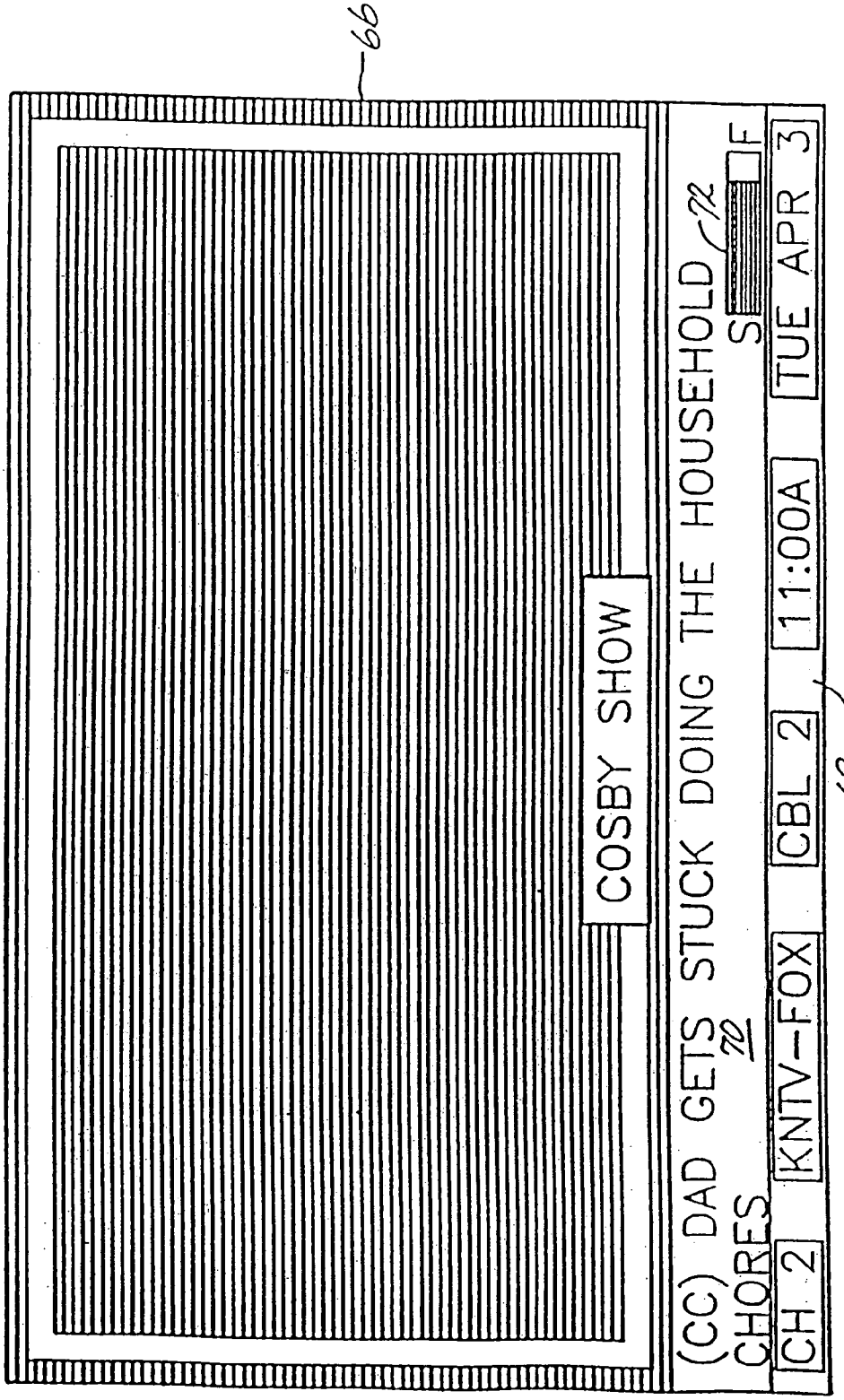
66
COSBY SHOW
(CC) DAD GETS STUCK DOING THE HOUSEHOLD CHORES
70
72
S F
CH 2
KNTV-FOX
CBL 2
11:00A
TUE APR 3
62

FIG.-10

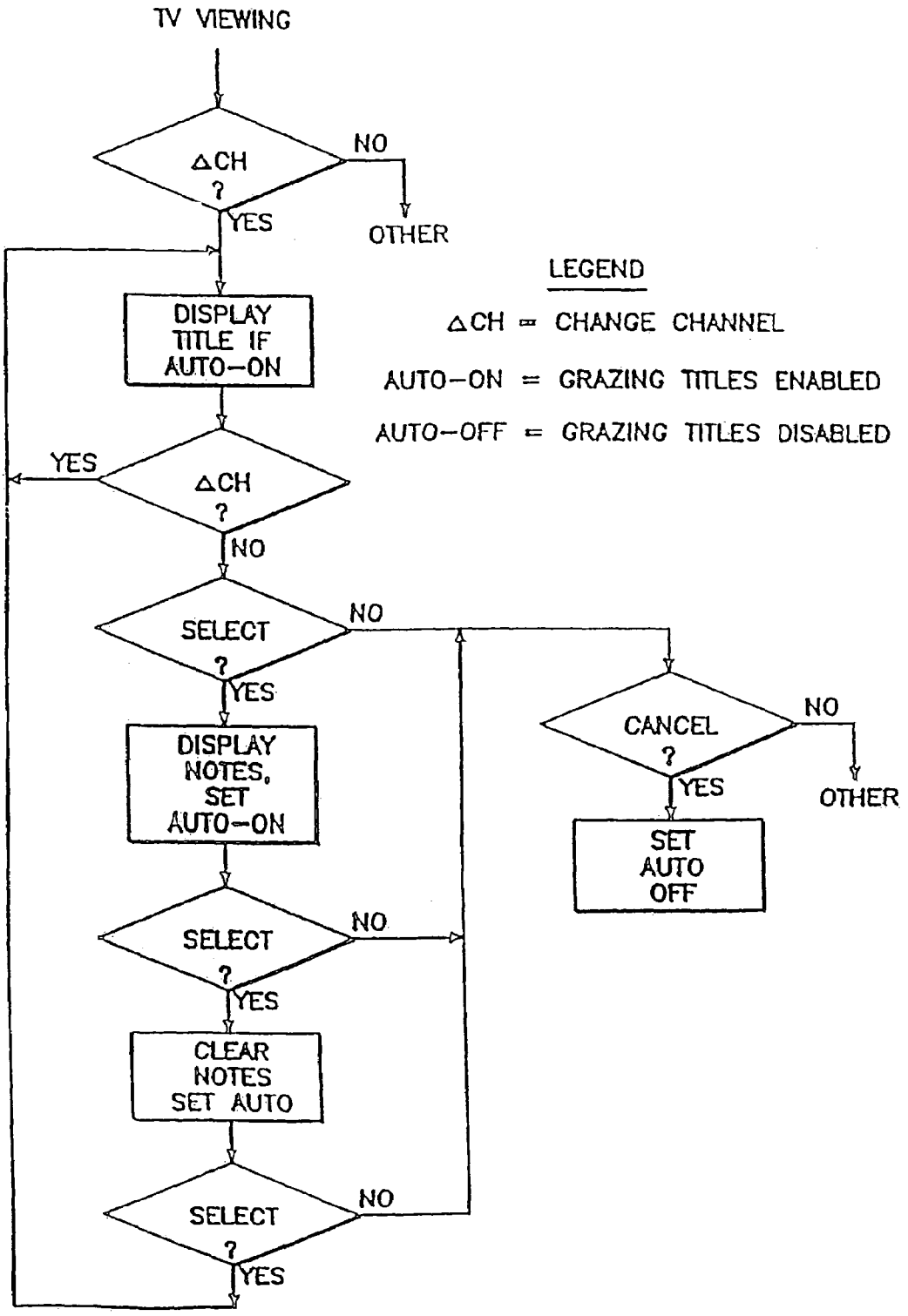
TV VIEWING
ΔCH ?
NO
OTHER
YES
DISPLAY TITLE IF AUTO-ON
YES
ΔCH ?
NO
SELECT ?
NO
YES
DISPLAY NOTES, SET AUTO-ON
SELECT ?
NO
YES
CLEAR NOTES SET AUTO
SELECT ?
NO
YES
CANCEL ?
NO
YES
OTHER
SET AUTO OFF
LEGEND
ΔCH = CHANGE CHANNEL
AUTO-ON = GRAZING TITLES ENABLED
AUTO-OFF = GRAZING TITLES DISABLED

FIG.—11

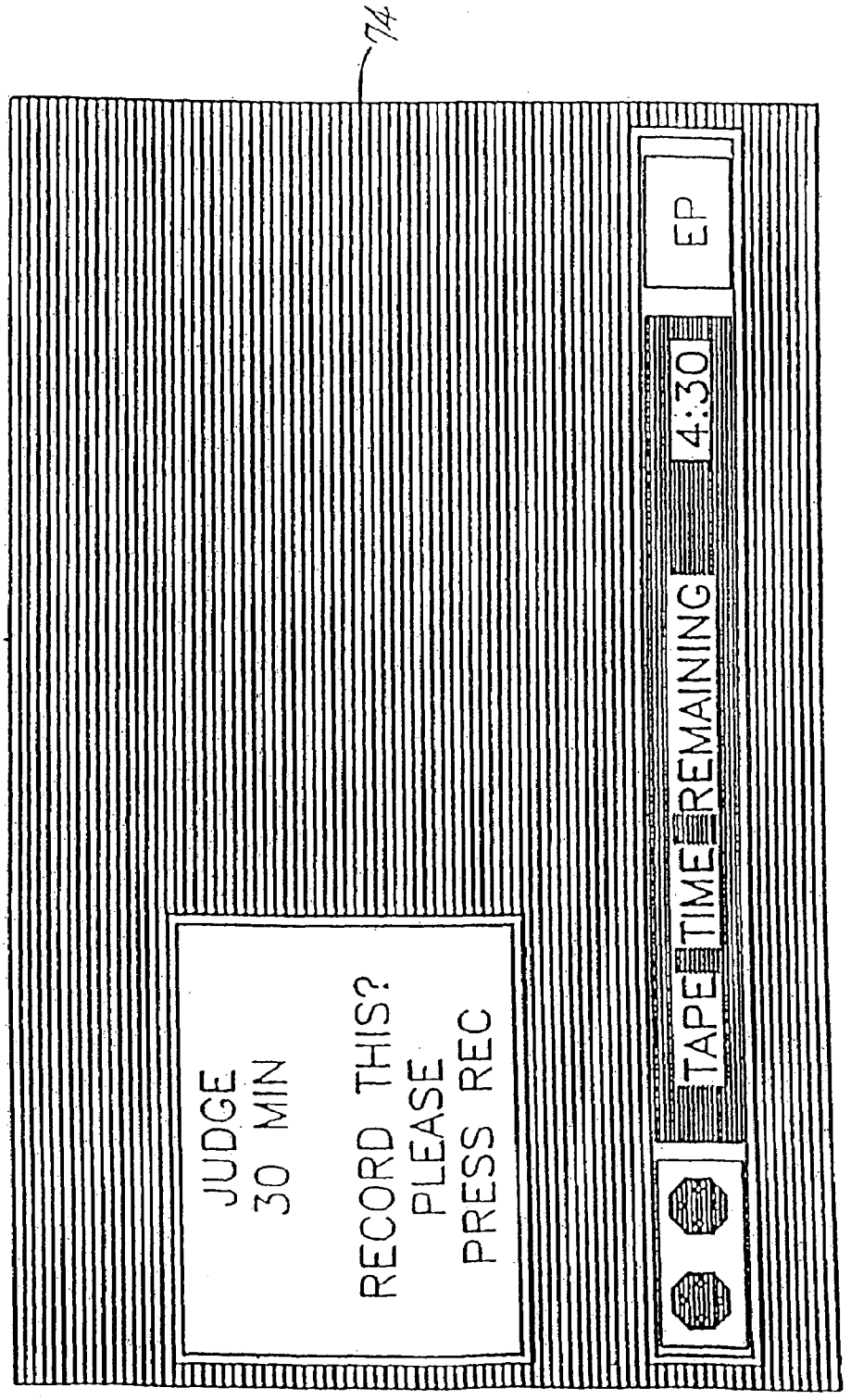
74
JUDGE
30 MIN
RECORD THIS?
PLEASE
PRESS REC
TAPE
TIME
REMAINING
4:30
EP

FIG.—12

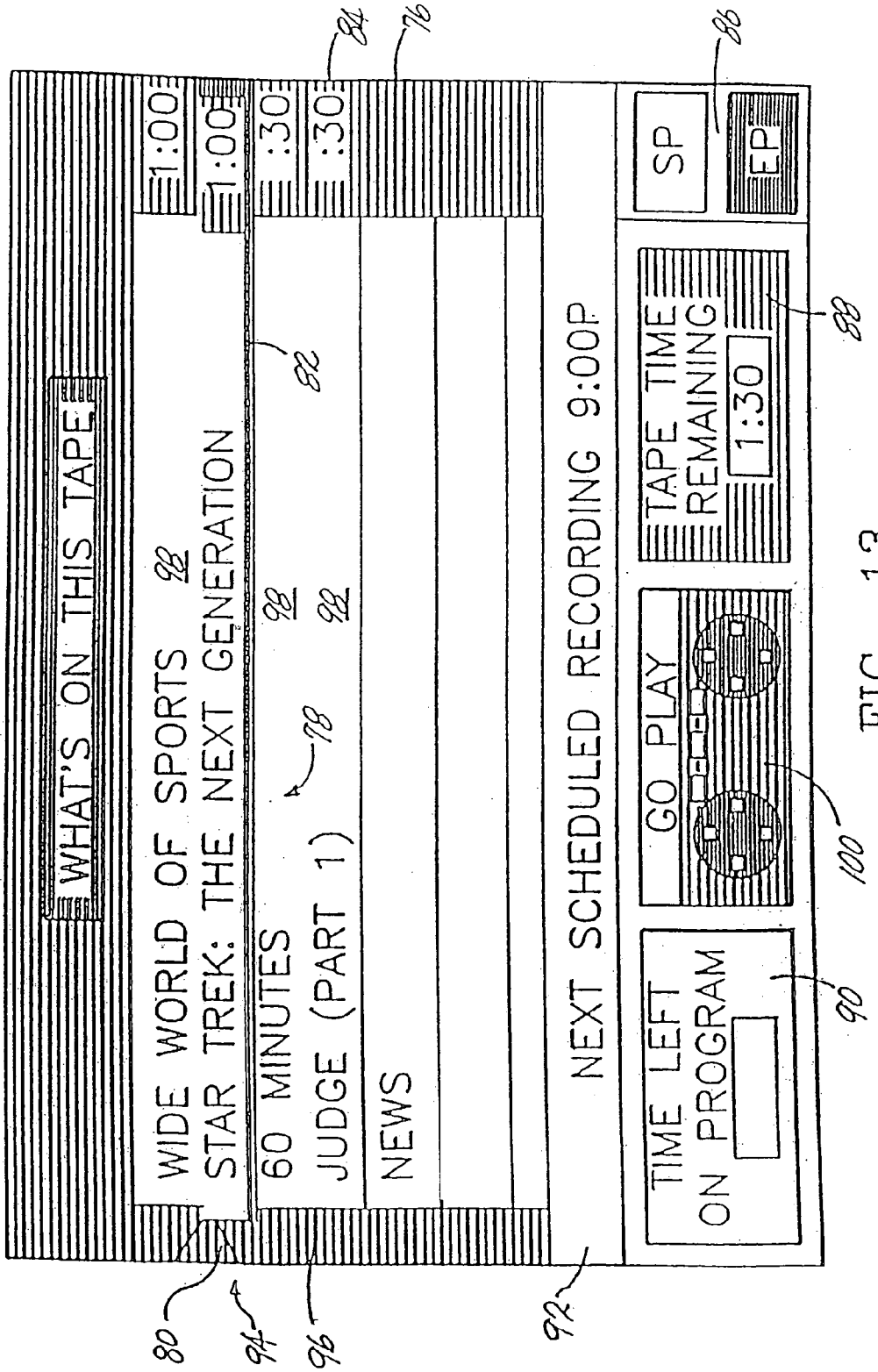
WHAT'S ON THIS TAPE
WIDE WORLD OF SPORTS
STAR TREK: THE NEXT GENERATION
60 MINUTES
JUDGE (PART 1)
NEWS
NEXT SCHEDULED RECORDING 9:00P
1:00
1:00
:30
:30
SP
EP
TAPE TIME REMAINING
1:30
GO PLAY
TIME LEFT ON PROGRAM
80
82
84
86
88
90
92
94
96
98
100

FIG.—13

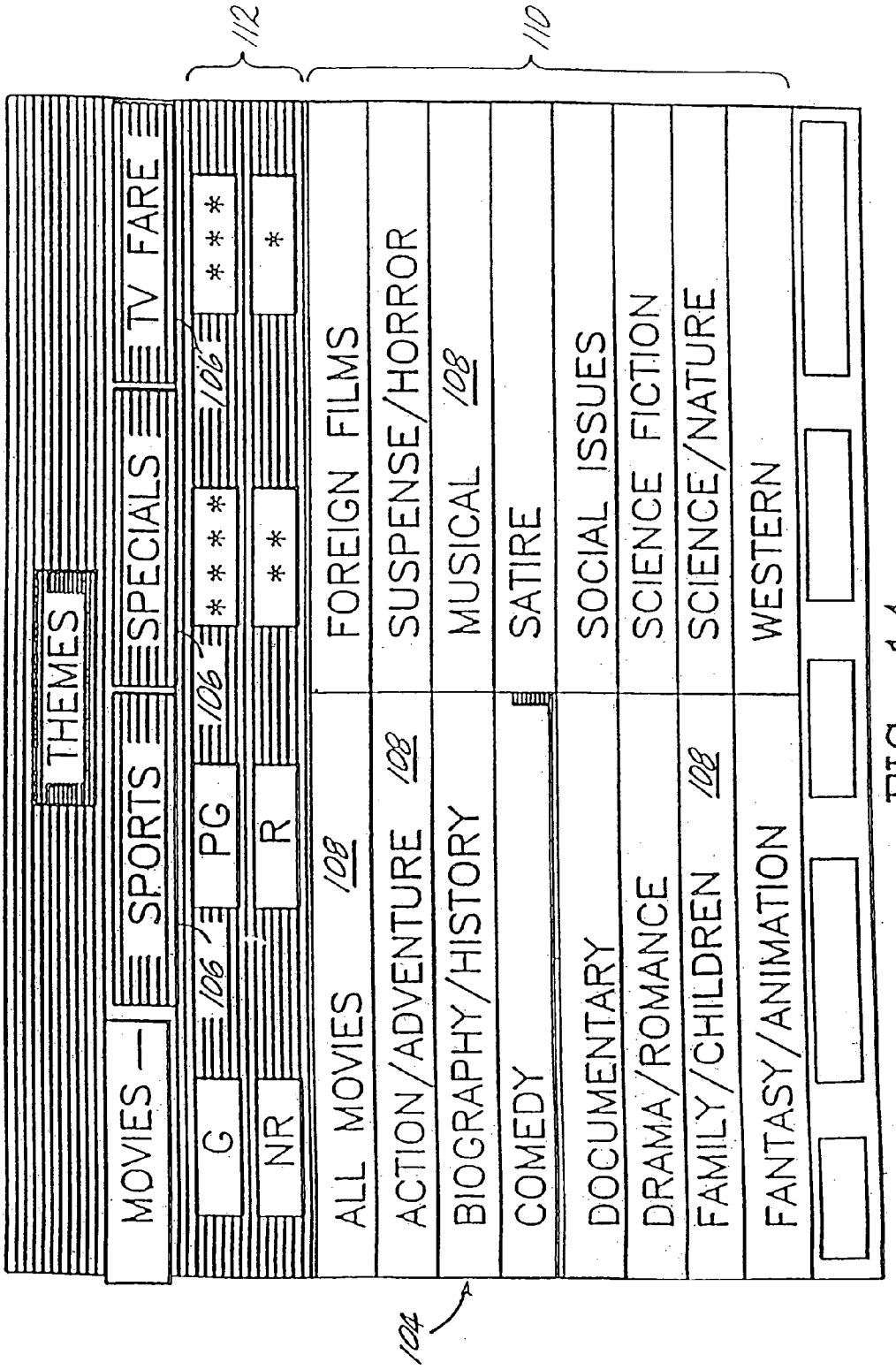
112
110
THEMES
MOVIES
SPORTS
SPECIALS
TV FARE
G
PG
R
NR
106
106
106
* * * *
* * *
* *
*
ALL MOVIES 108
ACTION/ADVENTURE 108
BIOGRAPHY/HISTORY
COMEDY
DOCUMENTARY
DRAMA/ROMANCE
FAMILY/CHILDREN 108
FANTASY/ANIMATION
FOREIGN FILMS
SUSPENSE/HORROR
MUSICAL 108
SATIRE
SOCIAL ISSUES
SCIENCE FICTION
SCIENCE/NATURE
WESTERN
104

FIG.-14

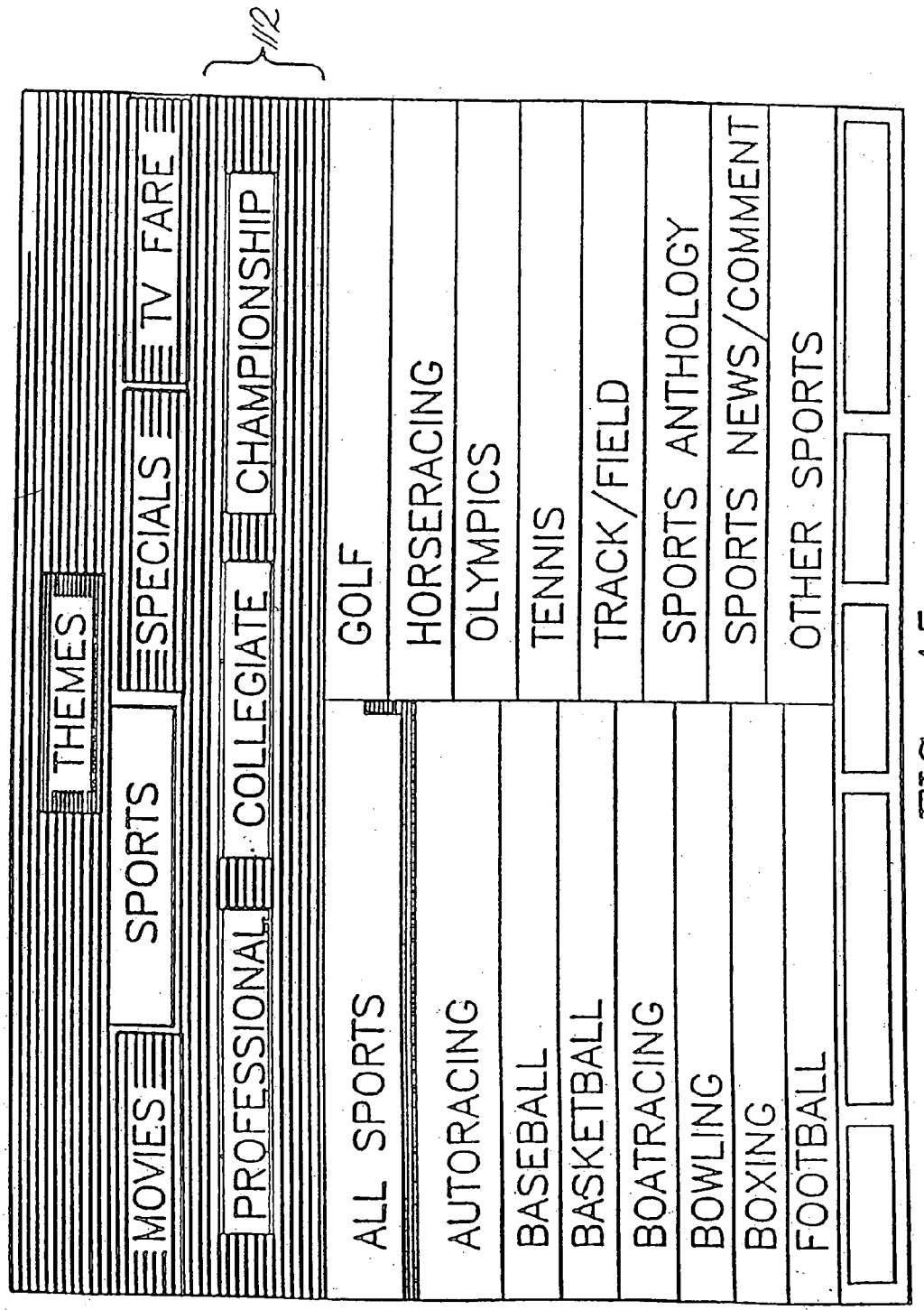
112
THEMES
SPORTS
MOVIES
SPECIALS
TV FARE
PROFESSIONAL
COLLEGIATE
CHAMPIONSHIP
ALL SPORTS
AUTORACING
BASEBALL
BASKETBALL
BOATRACING
BOWLING
BOXING
FOOTBALL
GOLF
HORSERACING
OLYMPICS
TENNIS
TRACK/FIELD
SPORTS ANTHOLOGY
SPORTS NEWS/COMMENT
OTHER SPORTS

FIG.—15

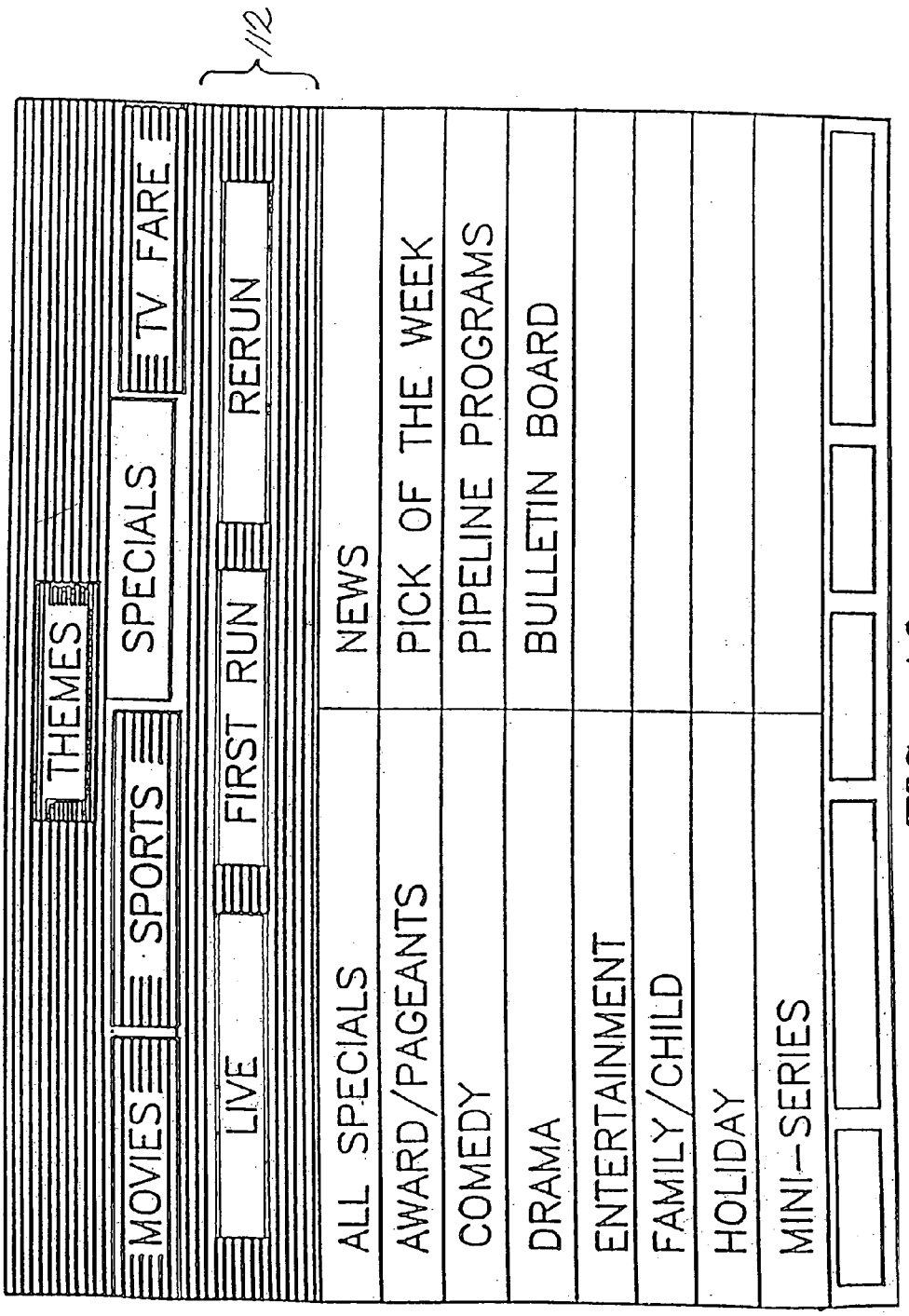
112
THEMES
SPORTS
MOVIES
SPECIALS
TV FARE
LIVE
FIRST RUN
RERUN
ALL SPECIALS
AWARD/PAGEANTS
COMEDY
DRAMA
ENTERTAINMENT
FAMILY/CHILD
HOLIDAY
MINI-SERIES
NEWS
PICK OF THE WEEK
PIPELINE PROGRAMS
BULLETIN BOARD

FIG.-16

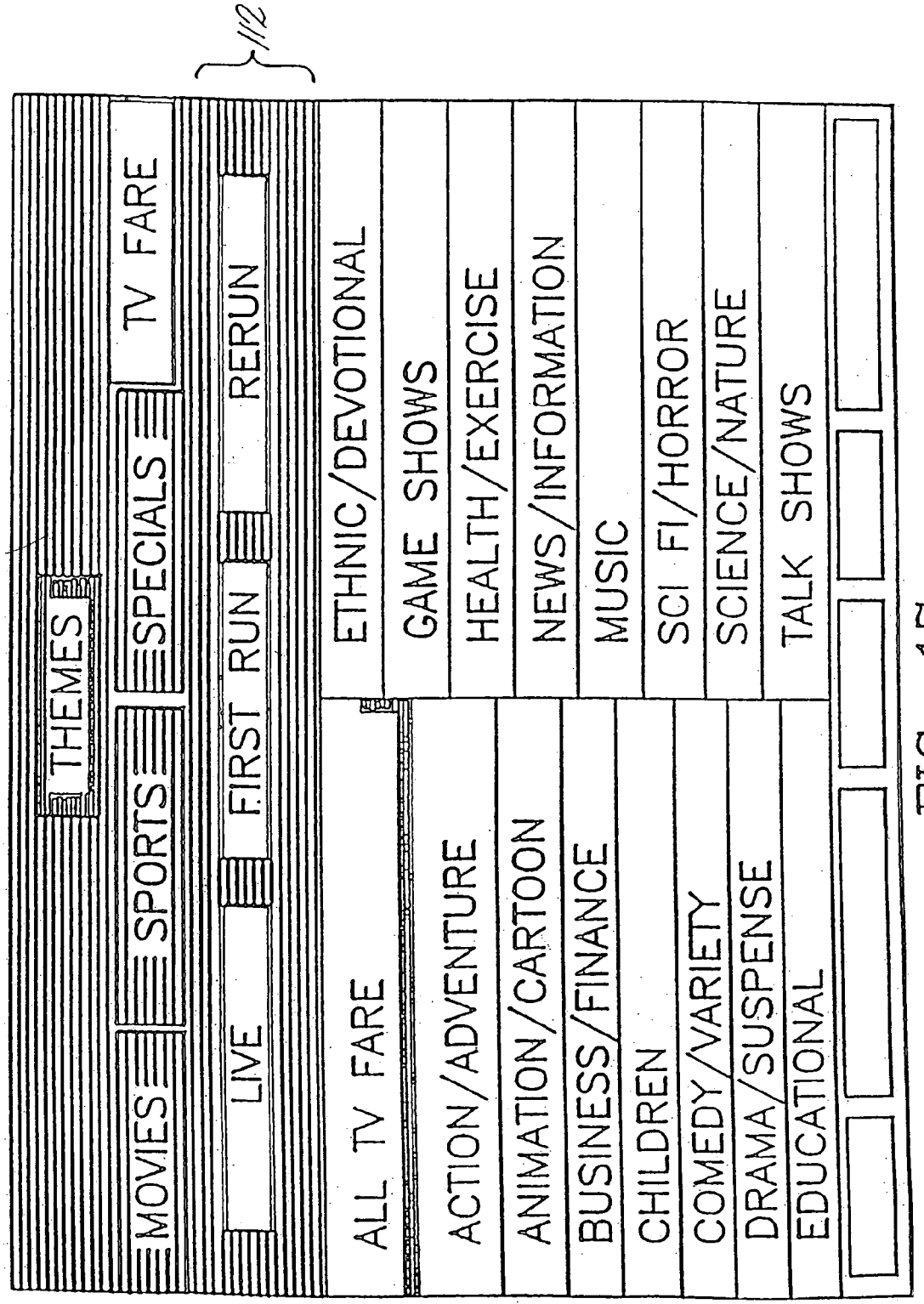
112
THEMES
SPORTS
SPECIALS
TV FARE
MOVIES
LIVE
FIRST RUN
RERUN
ALL TV FARE
ACTION/ADVENTURE
ANIMATION/CARTOON
BUSINESS/FINANCE
CHILDREN
COMEDY/VARIETY
DRAMA/SUSPENSE
EDUCATIONAL
ETHNIC/DEVOTIONAL
GAME SHOWS
HEALTH/EXERCISE
NEWS/INFORMATION
MUSIC
SCI FI/HORROR
SCIENCE/NATURE
TALK SHOWS

FIG.-17

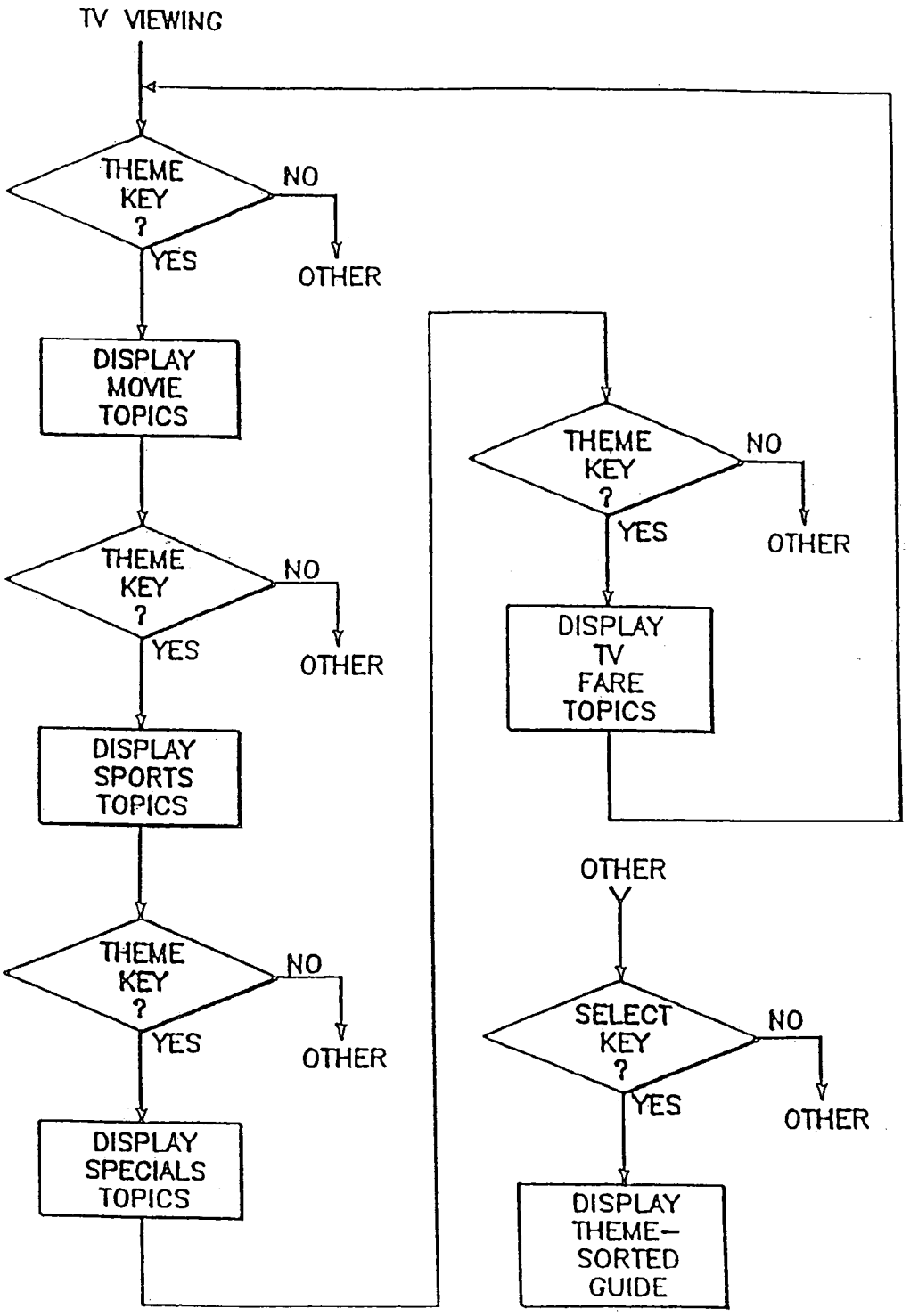
TV VIEWING
THEME KEY ?
NO
OTHER
YES
DISPLAY MOVIE TOPICS
THEME KEY ?
NO
OTHER
YES
DISPLAY SPORTS TOPICS
THEME KEY ?
NO
OTHER
YES
DISPLAY SPECIALS TOPICS
THEME KEY ?
NO
OTHER
YES
DISPLAY TV FARE TOPICS
OTHER
SELECT KEY ?
NO
OTHER
YES
DISPLAY THEME-SORTED GUIDE

FIG.-18

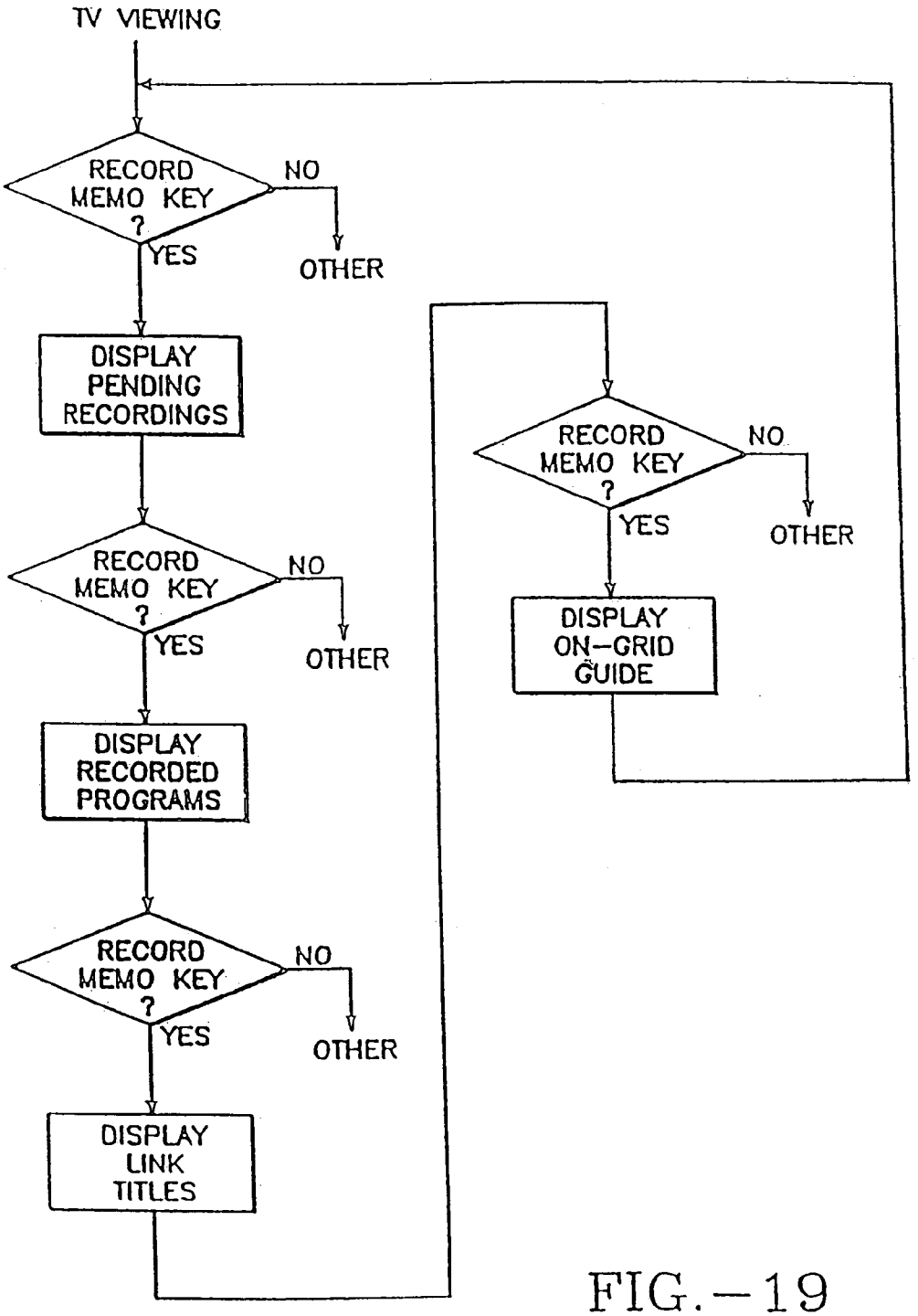
TV VIEWING
RECORD MEMO KEY ?
NO
OTHER
YES
DISPLAY PENDING RECORDINGS
RECORD MEMO KEY ?
NO
OTHER
YES
DISPLAY RECORDED PROGRAMS
RECORD MEMO KEY ?
NO
OTHER
YES
DISPLAY LINK TITLES
RECORD MEMO KEY ?
NO
OTHER
YES
DISPLAY ON-GRID GUIDE

FIG.—19

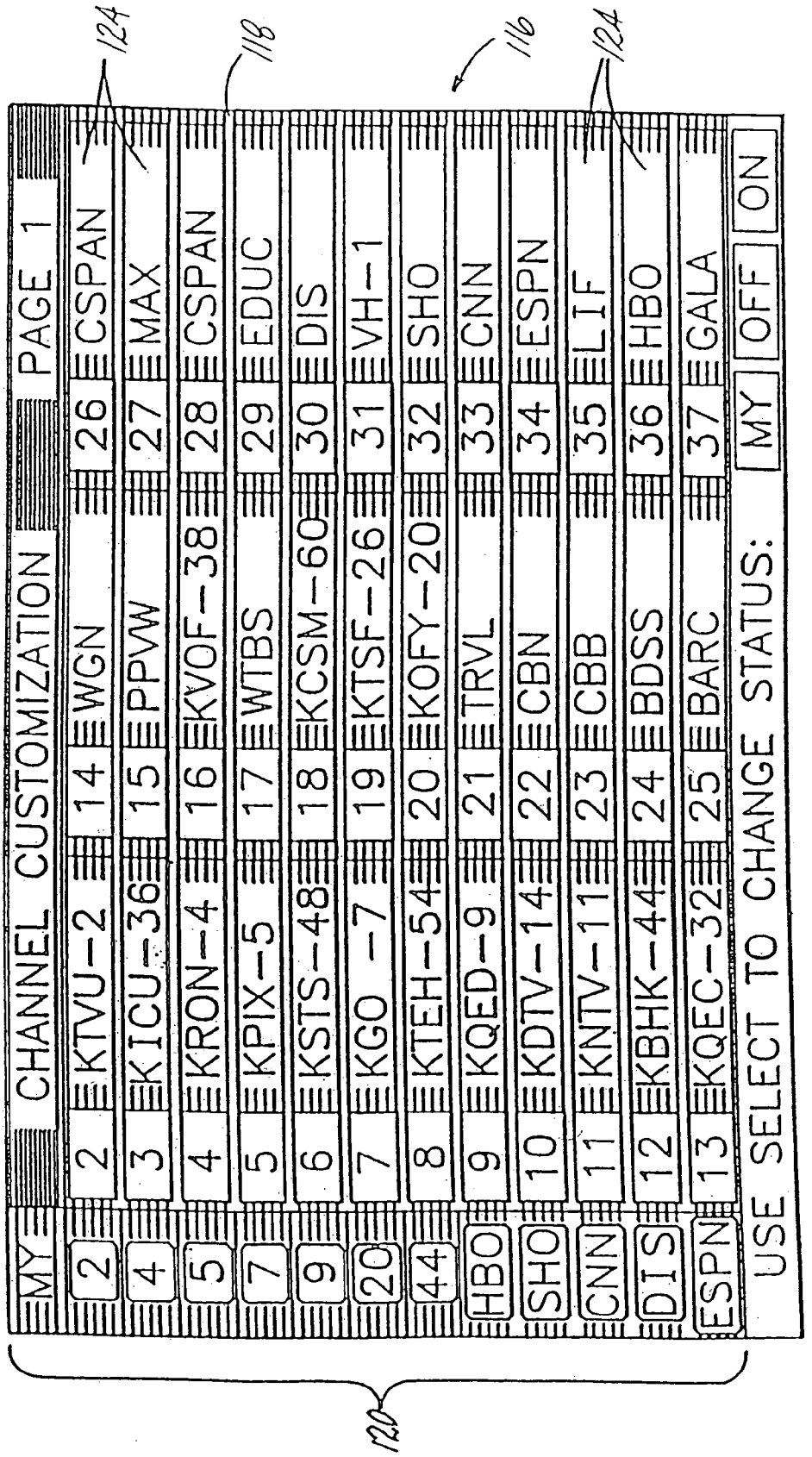
MY
CHANNEL CUSTOMIZATION
PAGE 1
2 KTVU-2 14 WGN 26 CSPAN
3 KICU-36 15 PPVW 27 MAX
4 KRON-4 16 KVOF-38 28 CSPAN
5 KPIX-5 17 WTBS 29 EDUC
6 KSTS-48 18 KCSM-60 30 DIS
7 KGO -7 19 KTSF-26 31 VH-1
8 KTEH-54 20 KOFY-20 32 SHO
9 KQED-9 21 TRVL 33 CNN
10 KDTV-14 22 CBN 34 ESPN
11 KNTV-11 23 CBB 35 LIF
12 KBHK-44 24 BDSS 36 HBO
13 KQEC-32 25 BARC 37 GALA
MY OFF ON
USE SELECT TO CHANGE STATUS:
2
4
5
7
9
20
44
HBO
SHO
CNN
DIS
ESPN
120
116
118
124
124

FIG.-20

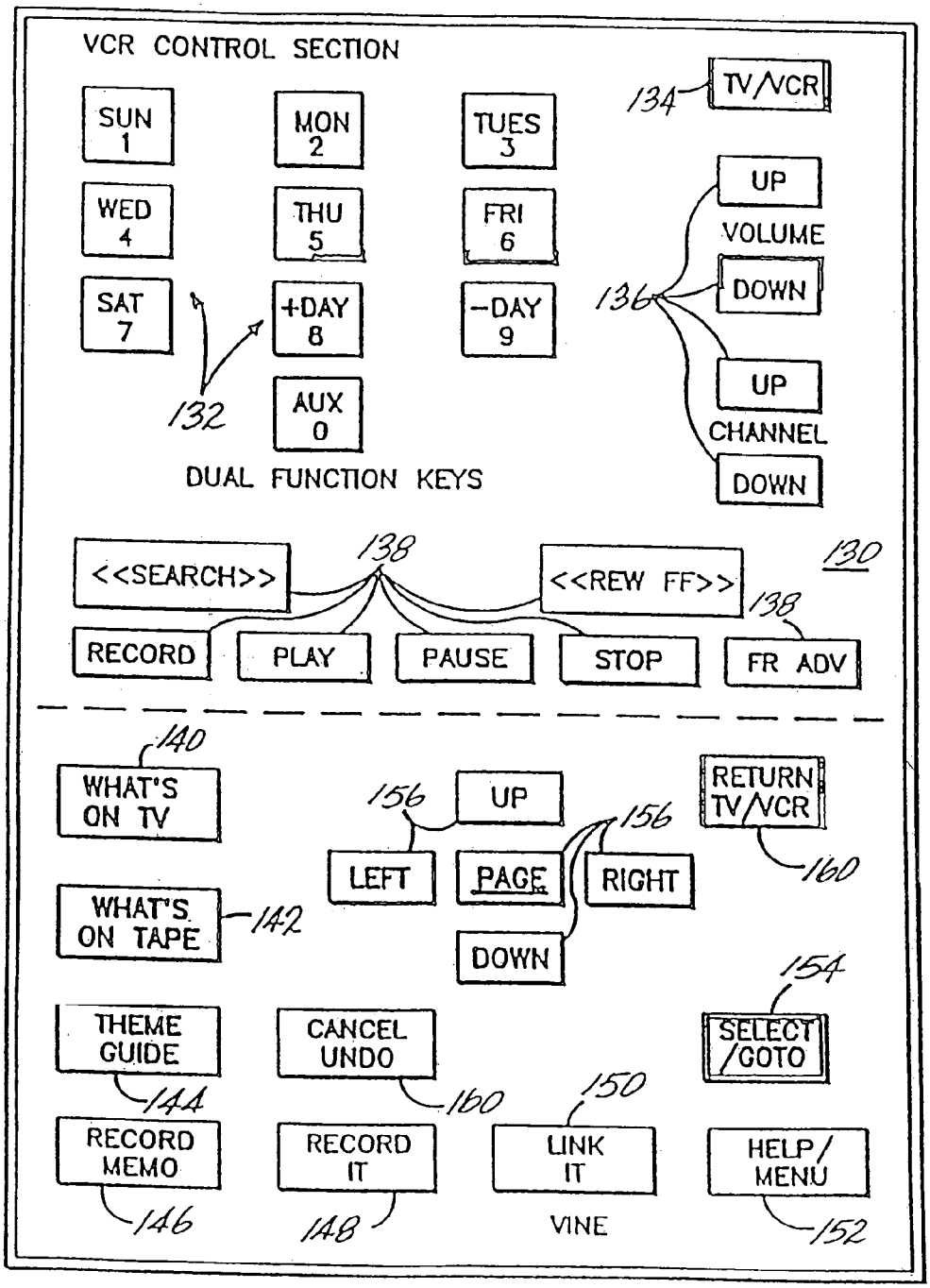
VCR CONTROL SECTION
SUN 1
MON 2
TUES 3
WED 4
THU 5
FRI 6
SAT 7
+DAY 8
-DAY 9
AUX 0
132
DUAL FUNCTION KEYS
134
TV/VCR
UP
VOLUME
DOWN
136
UP
CHANNEL
DOWN
<<SEARCH>>
138
<<REW FF>>
130
RECORD
PLAY
PAUSE
STOP
FR ADV
140
WHAT'S ON TV
156
UP
LEFT
PAGE
RIGHT
DOWN
RETURN TV/VCR
160
WHAT'S ON TAPE
142
154
THEME GUIDE
144
CANCEL UNDO
160
SELECT /GOTO
150
RECORD MEMO
146
RECORD IT
148
LINK IT
VINE
HELP/ MENU
152

FIG.—21

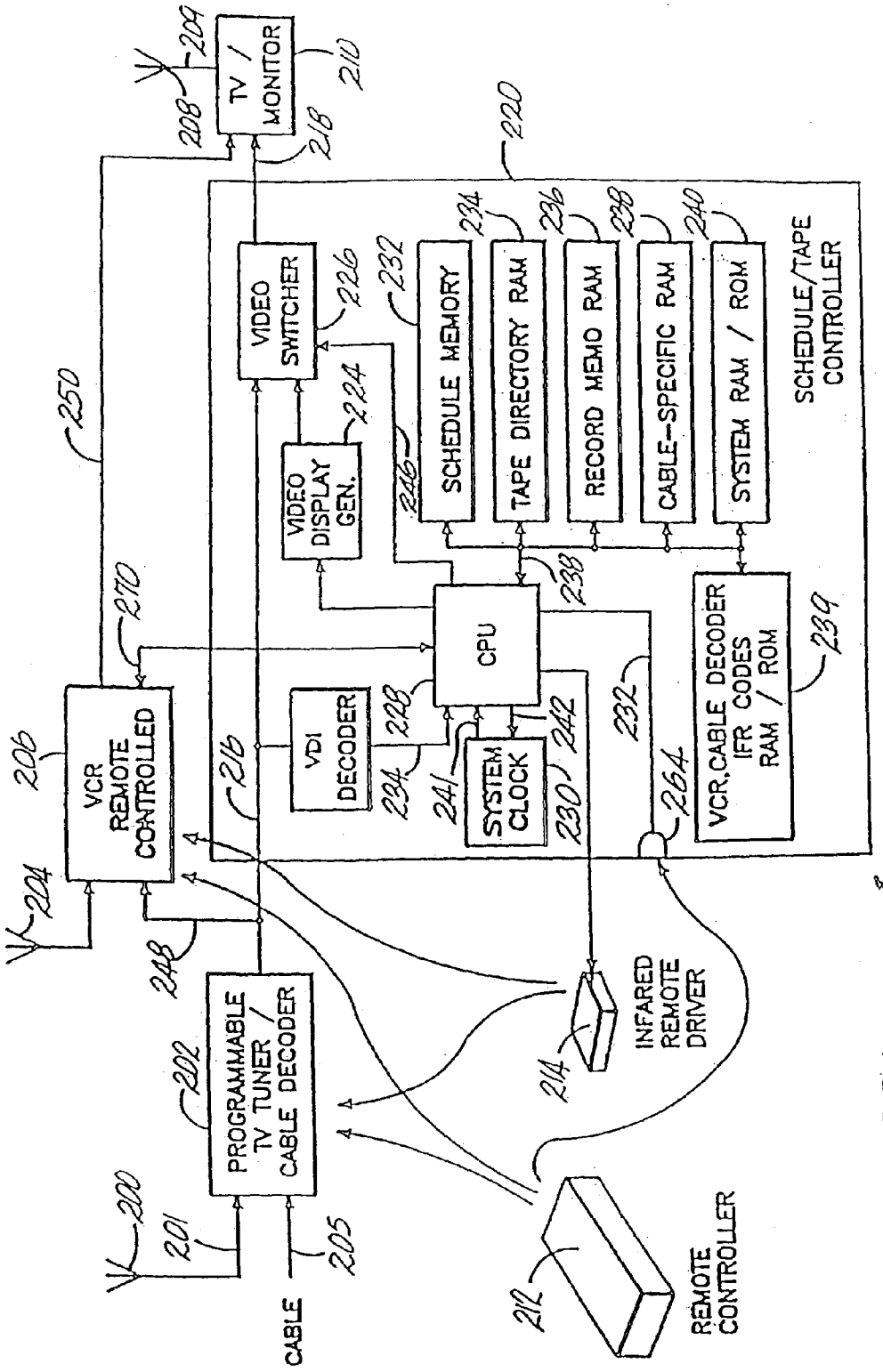
TV / MONITOR
VIDEO SWITCHER
VIDEO DISPLAY GEN.
SCHEDULE MEMORY
TAPE DIRECTORY RAM
RECORD MEMO RAM
CABLE-SPECIFIC RAM
SYSTEM RAM / ROM
SCHEDULE/TAPE CONTROLLER
CPU
VDI DECODER
SYSTEM CLOCK
VCR, CABLE DECODER IFR CODES RAM / ROM
VCR REMOTE CONTROLLED
PROGRAMMABLE TV TUNER / CABLE DECODER
INFARED REMOTE DRIVER
REMOTE CONTROLLER
CABLE
204
206
208
210
212
214
216
218
220
222
224
226
228
230
232
234
236
238
239
240
241
242
246
248
250
264
270
180
200
201
202
205

FIG.-22A

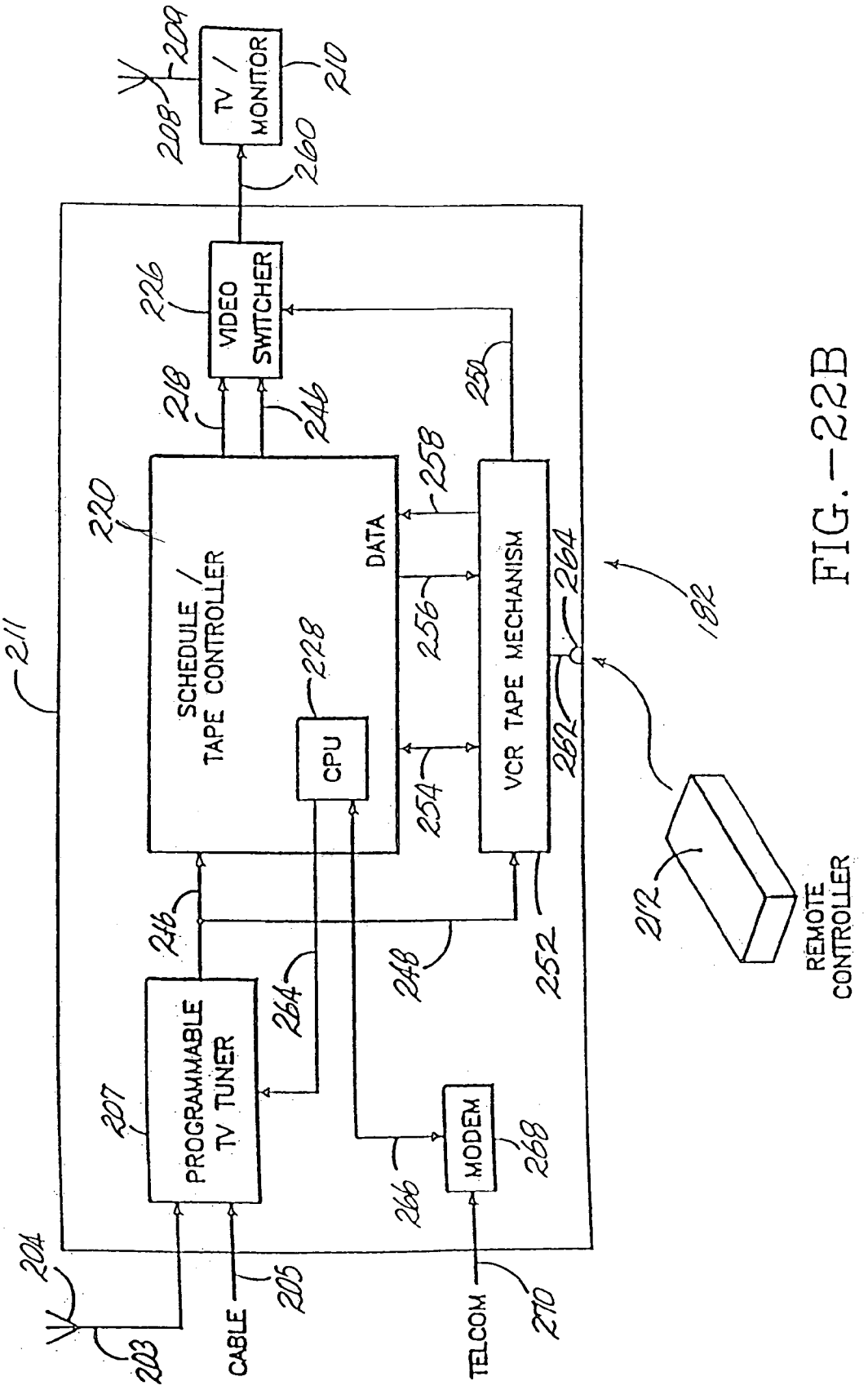
TV / MONITOR
VIDEO SWITCHER
SCHEDULE / TAPE CONTROLLER
DATA
CPU
VCR TAPE MECHANISM
PROGRAMMABLE TV TUNER
MODEM
CABLE
TELCOM
REMOTE CONTROLLER
211
182
204
205
203
207
208
209
210
212
218
220
226
228
246
248
250
252
254
256
258
260
262
264
266
268
270

FIG.-22B

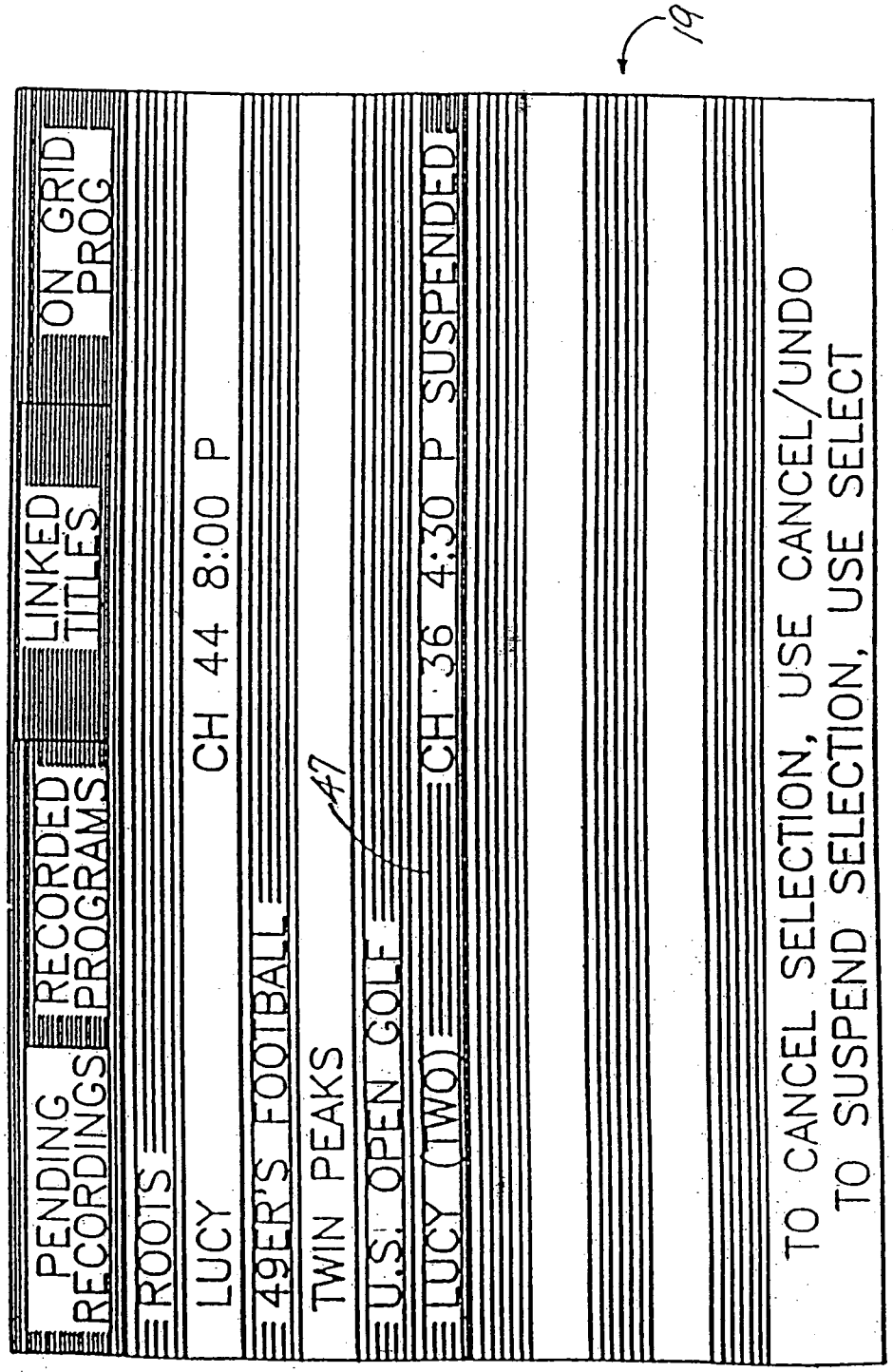
19
PENDING RECORDINGS
RECORDED PROGRAMS
LINKED TITLES
ON GRID PROG
ROOTS
LUCY
CH 44 8:00 P
49ER'S FOOTBALL
TWIN PEAKS
47
U.S. OPEN GOLF
CH 36 4:30 P SUSPENDED
LUCY (TWO)
TO CANCEL SELECTION, USE CANCEL/UNDO
TO SUSPEND SELECTION, USE SELECT

FIG.—23

USER INTERFACE FOR TELEVISION SCHEDULE SYSTEM

CROSS REFERENCE TO RELATED APPLICATIONS

This is a continuation application of U.S. patent application Ser. No. 10/943,288, filed on Sep. 17, 2004, which is a continuation application of U.S. patent application Ser. No. 10/616,137, filed on Jul. 9, 2003, which is a continuation application of U.S. patent application Ser. No. 10/393,489, now U.S. Pat. No. 6,850,693, filed on Mar. 19, 2003, which is a continuation application of U.S. patent application Ser. No. 10/081,141, filed on Feb. 22, 2002, now abandoned, which is a continuation application of U.S. patent application Ser. No. 09/277,703, filed Mar. 26, 1999, now U.S. Pat. No. 6,498,895, issued Dec. 24, 2002, which is a continuation of U.S. patent application Ser. No. 08/480,205, filed Jun. 7, 1995, now U.S. Pat. No. 5,949,954, issued Sep. 7, 1999, which is a divisional of U.S. patent application Ser. No. 08/198,538, filed Feb. 18, 1994, now U.S. Pat. No. 5,479,268, issued Dec. 26, 1995, which is a continuation of U.S. patent application Ser. No. 07/579,555, filed on Sep. 10, 1990, now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to a system and process that allows a television viewer to access on screen television program listings and use the program listings in an easy and convenient way to control operation of a video cassette recorder (VCR) or other recording device. In addition, it relates to such a system and process that creates a directory of recorded programs by title for easy retrieval and program playback. More particularly, it relates to such a system and process in which the VCR or other recording device is controlled by a simple selection of program title and a record command, even for recording at a future date and time. Most especially, it relates to such a system and process incorporating an intuitive user interface.

2. Description of the Prior Art

The difficulty of setting a VCR for automatic recording at a future date is notorious. Even users who are technically sophisticated will often make mistakes in the VCR programming procedure that cause them to record the wrong program or not to record anything at all. This difficulty has even resulted in a substantial body of humor dedicated to the subject of programming VCRs.

The difficulty of VCR programming has been alleviated somewhat by the development of VCRs that use a television set as a display for user prompts and feedback to the user during the programming process. U.S. Pat. No. 4,908,713, issued Mar. 13, 1990 to Michael R. Levine, discloses such a VCR using the television set as a display for VCR programming with an interactive user interface for directing the user on a step-by-step basis. Such a user interface removes a great deal of the mystery from VCR programming, but users still have difficulty with such a command-based interface and encounter problems carrying out the programming without making mistakes that cause them to miss recording programs they would like to watch at a different time than when they are broadcast.

Commonly assigned U.S. Pat. No. 4,706,121, issued Nov. 10, 1987 to Patrick Young, discloses a system and process in which user selections from television schedule information are used for automatic control of a VCR. That patent also contains a description of a proposed user interface for such a system and process. However, the provision of a highly intuitive user interface that makes such a system and process easy and convenient to operate is a difficult task. Further development of this system and process has produced considerable change in the user interface as originally proposed.

In addition to simplifying VCR programming, users who do a substantial amount of program taping also need an improved system and process for keeping track of their recorded programs. Commonly assigned application Ser. No. 07/219,971, filed Jul. 15, 1988, in the name of Patrick Young, discloses a system and process that provides indexing capability for taped material. A user interface for a television schedule system and process should also handle this capability on an intuitive basis.

Thus, while the art pertaining to the control of VCRs and to television schedule systems is a well-developed one, a need still remains for a television schedule system and process incorporating an improved user interface. In particular, unlike most computer menus, a grid TV guide is an array of irregular cells, where the cell size can vary from a fraction of an hour to many hours—extending well beyond the current screen. If this array is navigated by a cursor that goes from cell to cell, a single cursor command can produce violent screen changes. For example, a cursor right command may cause an abrupt jump to a cell situated several hours from the current page. Not only is this unsettling, but may take considerable effort to recover. Clearly, a gentler cursor motion is needed for the irregular cells found in a grid TV guide.

Printed grid television schedule guides often include additional information besides the program title and broadcast names. Such grids are also typically provided in combination with a more detailed printed schedule that contains a synopsis of each program, whether the program is a repeat, ratings for movies, and other information. When using a television set as a display for a schedule system, the size and resolution of the television display limit the amount of text that can be displayed with the grid. Improved techniques are required for conveying the most amount of information to the user in an easily understood manner within the limitations of the television display. When a large number of channels are available for viewing, there is also a need to order the display of information most conveniently for the user.

SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to provide a television schedule system and process with a user interface that is configured to compensate for the particular nature of the television schedule information.

It is a further object of the invention to provide such a user interface having a cursor operation that compensates for an irregular grid format of the television schedule information.

It is another object of the invention to provide such a user interface in which the schedule information is presented in a format that compensates for limited resolution of the television display.

It is still another object of the invention to provide such a user interface in which supplemental schedule information is presented in overlays that obscure a minimum amount of useful other information.

It is a still further object of the invention to provide such a user interface in which order of presentation of the schedule information is customizable by user preference.

The attainment of these and related objects may be achieved through use of the novel television schedule system and process user interface herein disclosed. A television schedule system including a user interface in accordance with this invention has a display. A means is connected to the display for displaying the television schedule on the display as an array of irregular cells which vary dimensionally in length, corresponding to different television program time lengths. A means is connected to the display for providing a cursor with the television schedule on the display. The cursor has a variable length corresponding to the length of a selected one of the irregular cells in which the cursor is located. A means is connected to the means for providing the cursor for moving the cursor in the array in a series of equal length steps. At least some of the irregular cells have a length which is greater than the length of the steps.

In the process of operating a television schedule system with the user interface of this invention, the television schedule is displayed as an array of irregular cells which vary dimensionally in length, corresponding to different television program time lengths. A cursor is provided with the television schedule on the display, the cursor has a variable length corresponding to the length of a selected one of the irregular cells in which the cursor is located. The cursor is moved in the array in a series of equal length steps, with at least some of the irregular cells having a length which is greater than the length of the steps.

In another aspect of the invention, a control system for a video recording machine has a controller for starting and stopping the video recording machine, for recording video information on recording media, and for playing recorded video information on recording media. A display generator provides display image generation signals. A means supplies information to the display generator for generation of display images relating to operation of the video recording machine. The means for supplying information includes means for generating a recording media position indicator graduated as segments corresponding to programs recorded on the recording media.

In a process for controlling a video recording machine, a recording media position indicator is graduated as segments corresponding to programs recorded on the recording media. The recording media position indicator is displayed as position of a selected one of the recording media in the video recording machine is changed.

In a further aspect of the invention, a television schedule system a display and means connected to the display for displaying the television schedule on the display. The means for displaying a schedule is configured to allow selection by a user of a first number of desired channels for display of schedule information which is less than a second number of available channels. A programmable tuner is connected to the means for displaying a schedule. The programmable tuner is configured to follow the first number of desired channels when the television schedule is shown on the display in response to a channel up or channel down command. The programmable tuner is configured to follow the second number of available channels in the absence of the television schedule on the display in response to a channel up or channel down command.

In a process for operating a television schedule system, a first number of desired channels is selected for display of schedule information, which is less than a second number of available channels. The schedule information is displayed on a display. The first number of desired channels is followed when the schedule information is shown on the display in response to a channel up or channel down command. The second number of available channels is followed in the absence of the television schedule on the display in response to a channel up or channel down command.

The attainment of the foregoing and related objects, advantages and features of the invention should be more readily apparent to those skilled in the art, after review of the following more detailed description of the invention, taken together with the drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. **1**–**3** are diagrammatic representations of a television schedule grid incorporating the user interface for the system and process of this invention.

FIG. **4** is a diagrammatic representation of a screen display used in the system and process of the invention.

FIGS. **5**–**7** are additional diagrammatic representations of the television schedule grid incorporating the user interface for the system and process of the invention.

FIG. **8** is a flow chart for understanding the operation of the FIG. **7** diagram.

FIGS. **9**–**10** are additional diagrammatic representations of screen displays of the user interface for the system and process of the invention.

FIG. **11** is a flow chart for understanding the operation of the FIGS. **9**–**10** diagrams.

FIGS. **12**–**13** are diagrammatic representations of taping and tape index screen displays of the user interface for the system and process of the invention.

FIGS. **14**–**17** are diagrammatic representations of program selection by category screen displays of the user interface for the system and process of the invention.

FIG. **18** is a flow chart for understanding operation of the FIGS. **14**–**18** diagrams.

FIG. **19** is a flow chart for understanding operation of the FIG. **20** diagram.

FIG. **20** is a diagrammatic representation of a channel customization screen display of the user interface for the system and process of the invention.

FIG. **21** is a diagrammatic plan view of a control panel for the system of the invention.

FIG. **22** is a block diagram of a television schedule system in accordance with the invention.

FIG. **23** is a diagrammatic representation of a screen display used in the system and process of the invention.

DETAILED DESCRIPTION OF THE INVENTION

Turning now to the drawings, more particularly to FIGS. **1**–**7**, there are shown a series of menu screens **10**, **12**, **14**, **16**, **18**, **20** and **22** used in operation of the system and carrying out the process of the invention. Screens **10**, **12**, **14**, **18** and **20** each consists of an array **24** of irregular cells **26**, which vary in length, corresponding to different television program lengths of one half hour to one-and-one half hours or more. The array is arranged as three columns **28** of one-half hour in duration, and twelve rows of program listings. Some of the program listings overlap two or more of the columns **28** because of their length. Because of the widely varying length of the cells **26**, if a conventional cursor used to select a cell location were to simply step from one cell to another, the result would be abrupt changes in the screens **10**, **12**, **14**, **18** and **20** as the cursor moved from a cell **26** of several hours length to an adjacent cell An the same row. Such abrupt changes disorient a user of the system.

An effective way of taming the motion is to assume that behind every array **24** is an underlying array of regular cells. By restricting cursor movements to the regular cells, abrupt screen changes will be avoided.

However, there is now a potential ambiguity between the underlying cell which governs cursor movement and a visible cell **26** which holds the program title.

Viz: if the cursor moves in half hour steps, and the cell length is, say four hours, should the cursor be ½ hour long or four hours long? If the cursor only spans the interval of the underlying cell (½ hour), the cursor appears to be highlighting a segment of the cell, which is misleading. On the other hand, if the cursor spans the entire four hours of the TV listing, the cursor underlying position will be obscure. In this case, cursor right/left commands will appear inoperative while traversing a long cell. The absence of feedback following a cursor command is befuddling to users. Therefore, an innovative cursor **32** (FIG. **1**) for the irregular array **24** is required which satisfies several conflicting requirements.

With the cursor **32**, the entire cell **26** is 3-D highlighted, using a conventional offset shadow **34**. The offset shadow **34** is a black bar that underlines the entire cell and wraps around the right edge of the cell. To tag the underlying position—which defines where the cursor **32** is and thus, where it will move next—portions **36** of the black bar outside the current underlying position are segmented, while the current position is painted solid.

For an half hour cell **26**, the offset shadow's underline bar will always be solid black. FIGS. **2** and **3** show the cursor **32** as it appears for a half-hour program. For programs that go beyond ½ hour, only the current ½ hour position will be solid black. All remaining positions will be stripped. If the cursor is moved left or right, the solid section will move accordingly, providing complete visual feedback. Thus, this modified 3D offset shadow cursor **32** satisfies the demands stated above: it spans the entire cell, yet clearly highlights the current underlying position. Movement of the cursor **32** will always be visible even for cells **26** that are much longer than the underlying cell.

A grid continuity icon **38** is shown in FIG. **1**. Printed grid television schedule guides often include parenthetical comments, (such as "cont'd") to indicate program continuity. In an electronic guide displayed on a TV screen, limited text space precludes parenthetical comments. To conserve space, an icon **38** will be used to indicate cell **26** continuity. At the border of a cell **26** that is continued to the next screen, an arrow icon **38** pointing to the right will be overlaid. The arrow direction always points to right, which is the direction of program elapse.

FIGS. **2** and **3** show recording status representations. When a program has been selected for recording, its listing cell **26** will be outlined or highlighted in red, as indicated at **40**. If guard time has been added or deleted, the cell will be stretched or shrunk to reflect the change. Cell **26** continuity will be treated the same as above. There are four other record status-representations:

If the cell is actively being recorded, the outline **40** will blink off and on.

A recorded cell will be displayed with a solid red background **42** (Note: Not shown in drawing). A mis-recorded cell will be indicated by red hash-marks **44** over the title. A mis-recording can be the result of insufficient tape, VCR loss of power, stopped before completion, etc.

A program linking icon **46** is shown in FIG. **5**. After each schedule update, the schedule system examines the new listings for the occurrence of any titles that match a title in Linked Titles (FIG. **23**). If a title matches, it will automatically be tagged for recording. When a linked program is displayed in the guide, it will have two identifiers: a red outline **40** indicating that the title has been selected for recording, and a link icon **46** appended to the title to indicate that this title was link-selected. After a linked program has been recorded, it will be treated like any recorded program with the title shaded in red. To differentiate this recording from others, the link icon will remain appended to the title.

Further details on the linking feature are given in screen **19** of FIG. **23**. 1) A linked program **47** may be suspended by the user (perhaps to avoid conflict with a pending recording), by de-selecting the link title in the Link List screen, under the Record Memo command. A suspended link program will still be identified by a link icon, but the red-outline will be suppressed since the program will not be recorded. 2) A smart link process is used to tame the matching of titles when there is a likelihood of excessive candidates for recording. The Lucy show, for example, is often syndicated on several channels. Untamed linking of Lucy may result in a plethora of recordings. For such series, the link list will include the channel and time as well as the link title. For the avid Lucy-phile, the user can locate each series individually for linking. If there is more than one link title of the same name, the series will be numbered, in the order of acquisition. Thus, the second Lucy will be identified as Lucy (Two), at **47**.

FIGS. **1**–**3** show the columns **28** headed by half-hour header status indicators. The ½ hour header strip across the top of the grid TV guide has two auxiliary functions 1) as an indicator **48** of pending or in progress recording scheduled at that time, and 2) as a time-bar **50** to delineate the past from the future. The past is darkened, while the future is lightly shaded. If there is an in-progress recording, the ½ hour header will be red-outlined at **48** in the same manner as a pending recording title cell **26**.

FIG. **6** shows a television schedule grid screen with a program note overlay **52**. With limited text capacity on TV displays, it is preferable to display as many lines of TV listings as feasible. To handle program notes, which are text intensive, on-demand overlays **52** are used. Program note overlays **52** may include any or all of the following information:

A program genre
Program description
Stars and personalities
Year of release
Episodic subtitles
Run-time of program
Elapse-time of the program
Critique (Star Ratings)
Rating (PG, G, etc.)
Call letter, channel markers
Closed caption, stereo.

Program notes for a selected program are overlaid over the grid guide upon request. The program note can be toggled off/on using a SELECT command. The program note **52** overlays and hides 3 or 4 listings of a guide. To minimize concealment of the guide, an auto-roving note is used. The program note will overlay either the top half or bottom half of the screen, as necessary to avoid masking the title of the selected listing. If the cursor **32** is in the upper half of the screen, the note will appear in the bottom half, and vice versa. If the cursor **32** is moved to the lower half of the screen, the note will automatically position itself in the upper half of the screen.

FIGS. **1**–**3** and **5**–**6** show a channel column **54** in the television schedule grid **24**. Favorite stations and cable channels may be listed together to create a personalized grid guide. The channel column **54**, unlike most printed TV guides, has a mix of over-the-air station names and cable services names.

The grid **24** guide lists channels by favorite combinations of station number and cable names, and not in the usual numerical order. When viewing the grid **24** guide, a Tuner Up/Down channel command will be mapped according to the channels and order listed on the screen. When not viewing the guide, the tuner sequence will revert back to the usual numerical order. When the last channel on a page is reached, the next Tuner command will change the channel to the channel listed at the beginning of the following page.

When a channel to which the tuner is tuned is displayed on the grid **24**, it is highlighted, as shown at **56**. A grid **24** page may be changed by either a page command or by entering a channel Up/Dn command as described above. If a page is turned using the page command, the current channel is now located in the previous page, and will not be seen in the new page. Therefore, the new page must suppress the highlighting of a channel, since that indicates the current channel. Note that information about the current channel will still be presented in the channel information boxes **58** at the bottom of the screen.

When is the highlighting re-enabled? Once into the new page, the first channel up/down command will cause the tuner to automatically change to the channel listed in the last or first row respectively of the new page. Since the tuner channel is now located on the new page, the current channel will be highlighted again.

If the channel highlighting is not suppressed after a page is selected, by definition, the tuner must be changed to track the highlighted channel. This is undesirable since casual paging should not cause the channel to change.

When a guide is first opened, as shown in FIG. **2**, both, the cursor **32** and the current channel **56** are situated on the same row of the grid **24**. When the channel **56** is changed, it is desirable to drag the cursor **32** along with the channel in unison. In doing so, the cursor **32** will be ready for a Select command (to retrieve the program note) or for a Record It command. Cursor dragging by the channel command takes place whenever the channel **56** and cursor **32** are united on the same row. If they are not united, the cursor **32** is disengaged from the channel command. Note that dragging is not reciprocal; moving the cursor **32** does not affect channel selection.

FIG. **7** shows a screen **22**, showing a program list **58** for a single channel, generated by toggling a user What's On TV command, which switches between the grid **24** and the list **58**. The list **58** consists of rows **60** of sequential program listings on the channel and a channel information field **62**. Program notes are overlaid on the list **58** in the same manner as shown in FIG. **6** for the grid **24**.

Each What's On TV command alternates between the grid guide **24** and the What's Next on Channel row guide **58**. While viewing the grid guide **24**, the next What's On TV command will replace the grid guide **24** with a single-channel row guide **58**. FIG. **8** is the flow diagram for the What's On TV command.

The page relationship between the two guides **24** and **58** are tightly coupled. The single channel guide will open to the channel and schedule time that was selected by the cursor **32** on the grid **24**. While viewing the single channel guide **58**, the Up/Down channel command may be used to change the channel to be listed. When exiting the single channel guide **58** and returning to the grid guide **24**, the grid cursor **32** will be pointed to the channel and schedule time last selected on the single channel guide **58**.

FIGS. **9** and **10** show channel grazing overlays **64** and **66** that provide information on current programs when switching channels while watching television. In the overlay **64**, when scanning channels, the title of each program is overlaid at **68**, along with the name of the TV service (HBO, ABC etc.), the cable channel number, and the current date, day of week, and time in the channel information field **62**. The overlay **66** is the same as the overlay **64** except that this overlay includes a program note **70**, which is similar to the program note **52** in FIG. **6**, but contains information pertinent to a program currently being broadcast on the selected channel. To access program notes, press the Select key. In addition to the program note **70**, elapsed time is indicated by a percentage calibrated time bar **72**. The bar is bracketed by S for start, and F for finish. By default, titles will appear automatically when channels are scanned. Grazing Titles may be de-activated using the CANCEL key. To restore auto-titles, press Select while viewing TV. The flow diagram governing titles/program notes, while viewing TV, is shown in FIG. **11**.

An express recording screen **74** is shown in FIG. **12**. The express recording screen includes the following information:

Title of Program
Length of Program
Tape Time Remaining
Recording Speed.

FIG. **13** shows a tape index screen **76**. Locating a recorded segment is often an arduous task when several programs have been recorded on the tape. Without a table of contents, the VCR users muddle through stretches of recording trying to find what's recorded on the tape, where the beginning of the desired program is, and where the tape is now. Some premium VCRs provide tape indexing that automatically finds the start of each recording. However, while the viewer can find the start of a recording, the indexing VCRs do not record-titles. The net result is about as useful as a having a table of contents without chapter titles. Considerable searching is still required to find what is recorded at each index.

The tape index screen **76** provides a virtual tape directory, giving the equivalent function of a table of contents for a tape recording. There is a list **78** of titles of recorded programs, a pointer **80** to the start of the program, and a current position indicator cursor **82** showing the "chapter" location on the tape. The virtual directory is automatically compiled, revised and stored in off-tape memory as the user records over the tape.

The What's on Tape command will display a list of titles of programs recorded on the tape. The title of the selected program (the segment of tape that is positioned over tape head) is highlighted by the cursor **82**. The tape position pointer **80** dynamically tracks the current tape position. All searching is done simply by title, bypassing the need for index numbers. The tape directory is equivalent to a table of contents showing titles, but not page number. It automatically opens to the starting page by simply pointing to the title of the program. In addition to the tape directory **78** of recorded programs, the screen **76** includes a program duration field **84**, a recorded speed of each title field **86**, a remaining time left on tape field **88**, a remaining time left on program field **90** and a next scheduled recording time field **92**.

The virtual tape directory is generated as follows. It is difficult to implement a competent self-contained tape direc-

tory for a non-random access storage such as a video tape. No matter where the directory is stored on the tape, the latent access time to locate the directory and return to current position (for a standard six hour tape) is excruciating slow, in the order of 6 to 10 minutes.

If redundant directories are recorded uniformly across the tape to minimize latency time, the problem of sluggishness is merely shifted from playback to updating the multiple directories. After each video program is recorded, the entire tape must be scanned to update each directory. Even if this update process is automated, there is a question of excessive wear on tapes and the VCR itself. Viz: each recording, no matter how short, results in high-speed scanning of the entire tape in order to revise all directories.

Even more troubling is the question of when to perform the update, since there is no "safe" period for the VCR to take control. For example, the user may have stopped the tape momentarily, perhaps to skip commercials, only to find that the VCR has commandeered control and place the tape in a high speed update mode. The safest update is one that is user-initiated. Unfortunately, few VCR users will follow a regimented procedure of updating after each recording session. Clearly, an on-tape directory based on existing technology is not satisfactory.

The following innovative solution, the "virtual tape directory", stores directory information in off-tape memory and does not require an on-tape directory or any augmentation of the video cassette. Since the directory is held in external memory instead of the tape, it is best suited for tapes that have recently been played and recorded, the "working tapes".

When a program is recorded, the title of the program is written to the data (control track) channel of the tape and, at the same time stored in a non-volatile (NV) memory. Other information about the recorded program, such as length of program, theme category, date recorded, and tape identifier code may be written to the data channel, as well as stored in the NV memory. The NV memory is adequate to support a number of working tapes.

When a tape is first loaded, the tape data channel will be scanned for a few seconds to identify the recorded program under the tape head. This data will be matched against the directories stored in NV memory. If there is a match, the directory of the working tape will be displayed immediately when the What's On Tape key is pressed. The "virtual" tape directory appears to have been read from the tape, but is actually obtained from NVmemory.

If there is no match, a new directory for the tape will be created. During playback and recording of this tape, a virtual directory will be generated for that tape. Directories of inactive tapes will be automatically purged from memory as new working tapes are introduced.

It is relatively easy to estimate remaining time of a scheduled televised program with the assist of a clock and a TV schedule. In contrast, there are few clues as to current location during playback of a recorded program, particularly when there are several recorded segments on a tape. Tape index counters or running time clocks require diligent bookkeeping before the start of a recorded segment. Few consumers will tinker with 5 or 6 digit numbers when a "ballpark" indicator is adequate, such as, "is the program about over?", or "about when does the next segment starts?". Clearly, there is need to provide a location indicator without the burden of bookkeeping.

To provide an at-a-glance indicator of relative tape location, an on-screen tape position gauge **94** has been devised. The tape position gauge **94** consists of a vertical bar **96** with the arrow pointer **80** located on the left edge of the screen **76**. The arrow **80** dynamically tracks the current tape position as the tape is advanced or rewound.

The gauge **94** is graduated, not in linear units, but in units of recorded segments **98** with each segment labelled with its program title. Thus, a 10 minute program or a 6 hour program is represented as one vertical unit corresponding to the width of a segment **98**. However, the gauge **94** is linear within each segment **98**. If the arrow is pointing at the upper 25% of the program segment **98**, it indicates that the tape head is positioned over the first 25% of the program. If a conventional linear gauge were displayed, a far more complicated gauge would be required, that would likely confuse rather than clarify.

Thus, this tape gauge **94** provides a quick capsule indication of the where the tape head is currently positioned, relative to the current program, and relative to other programs or the tape, and the title of other programs.

The tape index screen **76** includes a tape motion indicator field **100**. When the tape is undergoing high speed repositioning, the What's On This Tape (WOT) screen **76** will be displayed. During high speed search of a long program, the tape gauge **94** will appear to be dormant, since the gauge is relatively coarse for programs of long duration. To supplement the tape gauge **94**, the tape indicator **100** is included. During high speed positioning, one of these messages will be displayed in the space above twin-hub tape icon **102**: GO PLAY, GO RECORD, FORWARDING, REVERSING, PAUSE, and STOP.

GO PLAY is displayed while the tape is repositioning to the selected title. When the title is reached, the WOT screen **76** will be displaced by the playback video. GO RECORD is displayed while the tape is positioning to the selected program segment **98**, where the new recording will be written.

FIGS. **14**–**17** show Theme function screens **104**. The Theme function allows the viewer to quickly sort the downloaded schedule and display a subset schedule-based on a subject of interest. The user has the freedom to select listings sorted first by major themes, second by topic(s) within a theme, and/or by topic qualifiers. All guides sorted by theme, topic and qualifier will be displayed in a row-tabulated format and begins by listing programs nearest to the current half-hour. The theme function screens **104** have the following attributes: Rotating Themes. There are four theme categories, with each theme title enclosed in horizontally-arranged selection boxes **106**. From left to right, the themes are: [Movies] [Sports] [Specials] [TV Fare] FIG. **18** is a flow diagram defining the Theme command. Topic Selection. There are up to 16 topics **108** for each theme arranged in an 8 row by two column field **110**. Any number of topics may be selected under a selected theme. Topics is a logical OR function, meaning that each listing that meets the definition of the topic will be displayed. For example under the theme of Movies, if the topic titles Comedy and Satire are selected, a subset schedule of both comedy movies-and-satire movies will be displayed.

Default All Selection. When the Theme screen **104** is first opened, the first slot (upper left most topic **108**) will be highlighted. This is the ALL function, which is the sum of all topics **108** for the selected theme. The ALL function was created to minimize key stroking. Without an all topic category, the user must enable all 16 topics **108** individually. Conversely, if the user wishes to go from an all topics to an individual topic, the user must cursor to and deselect each of the other 15 topics.

Qualifiers. Each theme includes a group of search attributes or qualifiers **112**. The qualifiers for each theme **106** are shown in the respective one of FIGS. **14**–**17** for each theme **106**. Any-number of qualifiers can be enabled at one time. These qualifiers perform a logical OR functions; they will select for display all listings (sorted first by theme and topic) that satisfy the qualifiers.

The qualifiers **112** are positioned for easy selection. The selection of qualifiers is made using the usual cursor commands. When a theme **106** is initially opened, by default, the cursor is located near the top of the screen. To minimize cursor commands, the qualifiers are also located near the top of the screen. In contrast, placing the qualifiers at the bottom of the screen would require a round trip of up to 16 key strokes.

The complete theme sorting strategy is defined as follows:

Listings=(Topic A+Topic B+etc.)*(Qualifier A+Qualifier b+etc.)

This may be read as listing all Topic A that also meets Qualifier A or Qualifier B, plus all Topic B that also meets Qualifier A or Qualifier B, etc.

Qualifiers, topics and themes are rooted in relational database operations and allow logical sorting of the schedule. To support these higher order of sorting, auxiliary data must be delivered to the VCR. In contrast, simple sorting operations, such as sorting by time and by channel are inherent in the fundamental information of a TV guide, and do not require auxiliary search data.

The keystroke sequence for using the themes screens **104** are as follows. While watching TV, the first Theme key command will summon the opening theme screen with the left most theme, Movies, highlighted. Further theme commands will rotate the theme selection from left to right. Each theme screen-will be initialized to the ALL (topics) selection. If no topic selection is made, an all topics guide for the selected theme will be displayed upon depressing the Select/Goto command.

To additionally sort the theme by a single topic, position the cursor key to the desired topic and depress the Select/Goto key. Use the cursor to return to a topic.

To sort by more than one topic, position the cursor over each desired topic and depress the Select key. When finished, press Select/Goto to display a multiple-topic guide.

To sort by one or more attributes, position the cursor over each desired attribute and press the Select key. When finished, move the cursor to a topic and press Select/Goto to retrieve the theme/attribute-sorted TV guide.

Other than express recording, all recording activities are controlled with the Record Memo screen **16** of FIG. **4**. The Record Memo screen **16** is accessed with a Record Memo key. When the Record Menu key is depressed, the following titles enclosed in horizontally-arranged selection boxes **114** will appear at the top of the opening screen. From left to right:

[Pending [Recorded [Linked [On-Grid Recordings] Programs] Titles] Prog.]

Each Record Memo key command will highlight a new selection, rotating from left to right, and wrapping around to Pending Recordings after the right most position. FIG. **19** is a flow diagram defining the Record Memo command.

FIG. **20** shows a Channel Customization, screen **116**. The screen **116** allows the user to customize channels to match viewing interest, providing a compact listing as well as eliminating undesired channels during up down scanning. During schedule update, a list of all cable channels available at the subscriber's cable system (or broadcast stations for over-the-air subscribers) is also delivered to the VCR. This unabridged set of channels may be customized using screen **116**.

The channel customization screen **116** has two fields, a 3 column field **118** listing up to 36 unabridged channels and a, single column field **120** listing 12 favorite MY channels. The latter is a replica of the channel descriptor column **122** (FIG. **1**) of the opening grid guide. Additional pages are available (using the page key to swap between the pages) to accommodate systems with more than 36 channels. Each cell **124** in the 3 column field i**18** contains the following information: Channel number and program service name (such as HBO or station KTVU, 2). The cell **124** is color-coded to indicate the following states:

ON, default state before any customization, with the cell **124** in light green background.

MY, favorite channels listed in the single column field **120**, also shown in the three column field **118** with a blue background.

OFF, a channel deleted from all guides, as well as during Channel Up/Dn scanning (still accessible using the ten key channel keypad). OFF cells have a gray background.

When first installed, the system assigns the first 12 (listed in numerical order) channels as MY favorites. The channel status may be changed by selecting a channel and picking a state, MY, ON, or OFF using the SELECT key.

Since only 12 favorites are allowed, the user must first remove a favorite channel by changing the status of an existing favorite channel to OFF or ON. When that is done, the first column will automatically open up a space for the next MY selection. When a new MY is selected, the MY column **120** will automatically insert the new selection in the prescribed order. The order of listing in the MY favorite channel column **120** is as follows:

All favorite broadcast stations will be listed first in numerical order. Next, all cable services will be listed in alphabetical order.

A new cable service, which displaces a previous service, will be inserted under the previous status. Example: If the channel was MY, the new service will be MY. However, a new cable service that appears on a new channel will be initialized ON.

FIG. **21** shows a front panel **130** for a remote controller of the schedule system. The top half of the front panel **130** corresponds to a conventional remote controller for a television set and a VCR. Included are a dual function ten key keypad **132**, with the alternate: functions of each key and its digit shown, a TV/VCR toggle key **134**, volume and channel up/down keys **136**, and VCR control keys **138**. The lower half of the front panel **130** contains control keys that are specific to the schedule system. Included are a What's On Tape key **140**, a What's On TV key **142**, a Theme key **144**, a Record Memo key **146**, a Record It key **148**, a Link It key **150**, a Help/Menu key **152**, a Select/Goto key **154**, Left, Right, Up, Down and Page Cursor keys **156**, a Return TV/VCR key **158** and a Cancel/Undo key **160**. The use of these keys has either been explained above or is apparent from their labels.

FIGS. **22**A and **22**B are block diagrams of television schedule systems/tape controllers **180** and **182** in which the user interface is used. The schedule system/controller **180** is applicable to existing television equipment, where the schedule system is separate from the basic television equipment. Programmable tuner **202** is shown as part of a cable decoder. The schedule system/controller **182** is shown as

integrated-into a VCR **211**. In this version, a cable decoder is not required, and tuner **207** is part of the VCR **211**. It should be clear from these two systems **180** and **182** that the schedule/tape controller may be integrated into other television equipment, such as a cable decoder or a TV/Monitor receiver. It is also practical to implement the entire schedule/tape controller in a remote controller by adding a text display, such as an LCD screen, on remote controller **212**.

In the system **180**, programmable tuner **202**, which may be part of a cable decoder unit, receives a TV signal from antenna **200** and/or from cable input **205**. Tuner output **216** goes to a vertical blanking interval (VIB) decoder **222**, which may be a closed caption decoder or a high speed teletext decoder. Listing information and other support information, such as cable channel assignment data, will be transmitted over the VBI by one or more local stations or cable channels several times a day or continuously.

When update is required, programmable tuner **202** will be tuned automatically to the station or cable channel carrying the data. After the VBI signal is processed by CPU **228**, the listing data is stored in schedule memory **232**, while the cable channel assignment data is stored in cable-specific RAM memory **238**. This data is used to convert generic TV source names, such as HBO, to channel assignments for the specific cable system.

Other information transmitted to the schedule/tape controller **180** and stored in the system RAM memory **240** includes clock update data to set system clock **230** automatically, schedule update time, which may vary from once a day to a continuously transmitted format, new theme categories, and last minute schedule change data.

For a What's on TV request, the listing stored in schedule memory **232** is retrieved, processed by CPU **228**, and outputted to video display generator **224**. Video switcher **226** is enabled by CPU output **246** to select the video display generator **224** output whenever schedule data is to be presented to the MT/monitor **210**.

When a request to time-shift record a program is made, the title of the program and its record parameters (channel, start time and length) is copied from the schedule memory **232** to the Record Memo RAM memory **236**. When the system clock **230** matches the schedule time, the CPU **228** will issue a channel command to the programmable tuner of the cable decoder **202**, and a power on and record command to VCR **206** by means of an infrared remote driver **214** directed at infrared input ports of these two devices. In the VCR integrated version **182**, the command to the tuner **207** is made on a wired bus **264**.

In addition to programming by selecting a title from the on-screen schedule, it is also possible to program the VCR **206** or **211** and the cable decoder **202** or **207** with remote controller **212**. In this mode, programming information is entered into the remote controller **212**, and at the required time, the remote controller **212** will issue programming commands to the proper TV device. While there are many universal remote controllers that offer programming capability, none allow the user to enter generic names, such as station and cable channel names, and have the CPU convert the names to specific channels for tuning the VCR or the cable decoder. This is implemented by incorporating CPU **228** and the cable-specific RAM **238** in the remote controller **212**.

Remote controller **212** and infrared remote driver **214** are capable of emulating the infrared command instructions required by the cable decoder **202** and VCR **206**. The command emulation codes for the remote driver **214**: are stored in cable decoder IFR code RAM/ROM memory **239**. Commands for popular cable decoders and VCRs are preprogrammed in ROM. Alternatively, the infrared commands of the original remote controller may be learned by aiming the controllers at the IFR input receiver **264** and storing the command codes in RAM memory **239** after processing by CPU **228**. This process is well known in the art of universal remote controllers and need not be detailed here.

As shown in FIG. **22**A, the VCR **206** and cable decoder **202** may be manually controlled by remote controller **212**, or it may be automatically controlled by infrared remote driver **214**.

During recording, the tape index location of the VCR **206** will be transmitted over control/data bus **270** to the CPU **228**. This start address information is stored in tape directory RAM memory **234**, together with the program title. The bus **270** also carries VCR control commands for recording, playback, tuner selection, and other functions, including power on/off.

Once a program is recorded, its title and other program information is stored in a section of the Record Memo RAM memory **236**. To play back a recorded program, the What's on Tape request will cause a directory of recorded programs on the tape to be displayed. When a program is selected for playback from this directory, the tape will fast forward or reverse to the tape index location specified in the Tape Directory RAM memory **234**.

In the system **182**, schedule/tape controller **220** is embedded in the VCR **211**. The VCR tape, mechanism **252** contains all the record and playback electronics of the video recorder, less the programmable tuner **207**. Data recorded on the control track of a tape is coupled to the CPU **228** over input bus **258** and output bus **256**. The art of recording data on the control track is well known, for example, in recent VCRs with indexing capability. CPU **228** commands to the VCR **211** are carried over bus **254**. When schedule information is to be displayed, video switcher control input **246** selects the display generator on line **218**. At other times, video switcher **226** selects the output of the VCR mechanism **252** on line **250**.

Schedule information maybe downloaded from the VBI. Alternatively or supplementally, it may be downloaded from a telecommunication line **270** to modem **268** and to CPU **228** via line **266**. Other means of delivering schedule information can be employed, including the use of a subcarrier channel on the cable service.

It should now be readily apparent to those skilled in the art that a system and method incorporating a novel user interface capable of achieving the stated objects of the invention has been provided. The user interface that is configured to compensate for the particular nature of the television schedule information. The user interface has a cursor operation that compensates for an irregular grid format of the television schedule information. The user interface presents the schedule information in a format that compensates for limited resolution of the television display. The user interface presents supplemental schedule information in overlays that obscure a minimum amount of useful other information. Order of presentation of the schedule information in the interface is customizable by user preference.

It should further be apparent to those skilled in the art that various changes in form and details of the invention as shown and described may be made. It is intended that such changes be included within the spirit and scope of the claims appended hereto.

What is claimed is:

1. A method comprising:

storing television program listings in a television guide system;

displaying a guide screen including television program listings corresponding to television programs, wherein at least one of the television program listings corresponds to a television program in a series of television programs; and

displaying an identifier with the at least one television program listing indicating to a viewer that the television program is in the series of television programs.

2. The method of claim 1 wherein the identifier further indicates to the viewer that the series of television programs has been scheduled for recording.

3. The method of claim 1 wherein the identifier further indicates to the viewer that the television program has been recorded.

4. The method of claim 1 further comprising scheduling at least one of the television programs for recording.

5. The method of claim 1 wherein the series of programs comprises linked programs of the same title.

6. The method of claim 1 wherein displaying an identifier with the program listings corresponding to programs scheduled for recording comprises displaying a recording indicator.

7. The method of claim 4 wherein displaying a guide screen including television program listings corresponding to television programs comprises indicating to the viewer a time at which the at least one television program is scheduled for recording.

8. The method of claim 4 wherein displaying a guide screen including television program listings corresponding to television programs comprises indicating to the viewer a channel number or channel name on which the at least one television program is scheduled for recording.

9. The method of claim 4 wherein displaying a guide screen including television program listings corresponding to television programs comprises indicating to the viewer a date on which the at least one television program is scheduled for recording.

10. The method of claim 4 wherein displaying a guide screen including television program listings corresponding to television programs comprises indicating to the viewer a day of the week on which the at least one television program is scheduled for recording.

11. The method of claim 4 wherein displaying a guide screen including television program listings corresponding to television programs comprises indicating to the viewer a title of the at least one television program scheduled for recording.

12. The method of claim 1 wherein the guide screen includes at least one television program listing that has been scheduled for recording.

13. The method of claim 1 wherein the guide screen includes at least one television program listing that has been recorded.

14. A system comprising:

a monitor;

one or more memories configured to store television program listings;

a processor coupled to the one or memories configured to display a guide screen on the monitor including television program listings corresponding to television programs, wherein at least one of the television program listings corresponds to a television program in a series of television programs; and

the processor being further configured to display an identifier with the at least one television program listing indicating to a viewer that the television program is in the series of television programs.

15. The system of claim 14 wherein the identifier further indicates to the viewer that the series of television programs has been scheduled for recording.

16. The system of claim 14 wherein the identifier further indicates to the viewer that the television program has been recorded.

17. The system of claim 14 wherein the processor is further configured to schedule at least one of the television programs for recording.

18. The system of claim 14 wherein the series of programs comprises linked programs of the same title.

19. The system of claim 14 wherein the identifier displayed with the program listings corresponding to programs scheduled for recording comprises a recording indicator.

20. The system of claim 17 wherein the guide screen comprises a time at which the at least one television program is scheduled for recording.

21. The system of claim 17 wherein the guide screen comprises a channel number or channel name on which the at least one television program is scheduled for recording.

22. The system of claim 17 wherein the guide screen comprises a date on which the at least one television program is scheduled for recording.

23. The system of claim 17 wherein the guide screen comprises a day of the week on which the at least one television program is scheduled for recording.

24. The system of claim 17 wherein the guide screen comprises a title of the at least one television program scheduled for recording.

25. The system of claim 14 wherein the guide screen includes at least one television program listing that has been scheduled for recording.

26. The system of claim 14 wherein the guide screen includes at least one television program listing that has been recorded.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 7,151,886 B2
APPLICATION NO. : 11/181188
DATED : December 19, 2006
INVENTOR(S) : Patrick Young et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On Title Page

Page 2 item ((56) In "Printed Materials ... ", change "182-1983" to --1982-1983--.

In the drawings, Sheet 22, FIG. 22A, the text of the device corresponding to reference numeral 214 should be changed from "INFARED" to --INFRARED--.

Column 3, line 47, insert --includes-- after "system".

Column 4, line 66, change "An" to --in--.

Column 5, line 57, change "status-representations" to --status representations--.

Column 7, line 37, delete "," after "both".

Column 8, line 40, change "record-titles" to --record titles--.

Column 8, line 40, change "as a having" to --as having--.

Column 9, line 19, change "place" to --placed--.

Column 9, line 62, change "starts" to --start--.

Column 10, line 16, change "of the where" to --of where--.

Column 10, line 38, change "schedule-based" to --schedule based--.

Column 10, line 48, insert --.-- after "[TV Fare]".

Column 10, line 56, change "movies-and-satire" to --movies and satire--.

Column 11, line 5, delete "a" after "perform".

Column 11, line 19, delete "b+etc.)" to insert --B+etc.)--.

Column 12, line 5, delete "," after "a".

Column 12, line 11, change "**i18**" to --**118**--.

UNITED STATES PATENT AND TRADEMARK OFFICE

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PATENT NO. : 7,151,886 B2
APPLICATION NO. : 11/181188
DATED : December 19, 2006
INVENTOR(S) : Patrick Young et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 12, line 49, delete ":" after "alternate".

Column 13, line 1, change "integrated-into" to --integrated into--.

Column 13, line 37, change "MT/monitor" to --TV/monitor--.

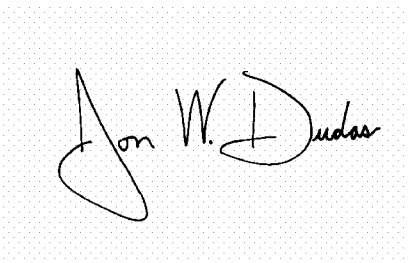
Column 13, line 66, delete ":" after "**214**".

Column 14, line 41, change "maybe" to --may be--.

Column 14, line 51, delete "that" after "interface".

Signed and Sealed this

First Day of May, 2007



JON W. DUDAS
Director of the United States Patent and Trademark Office